M. RCH 12, 1951

STEEL

The Weekly Magazine of Metalworking

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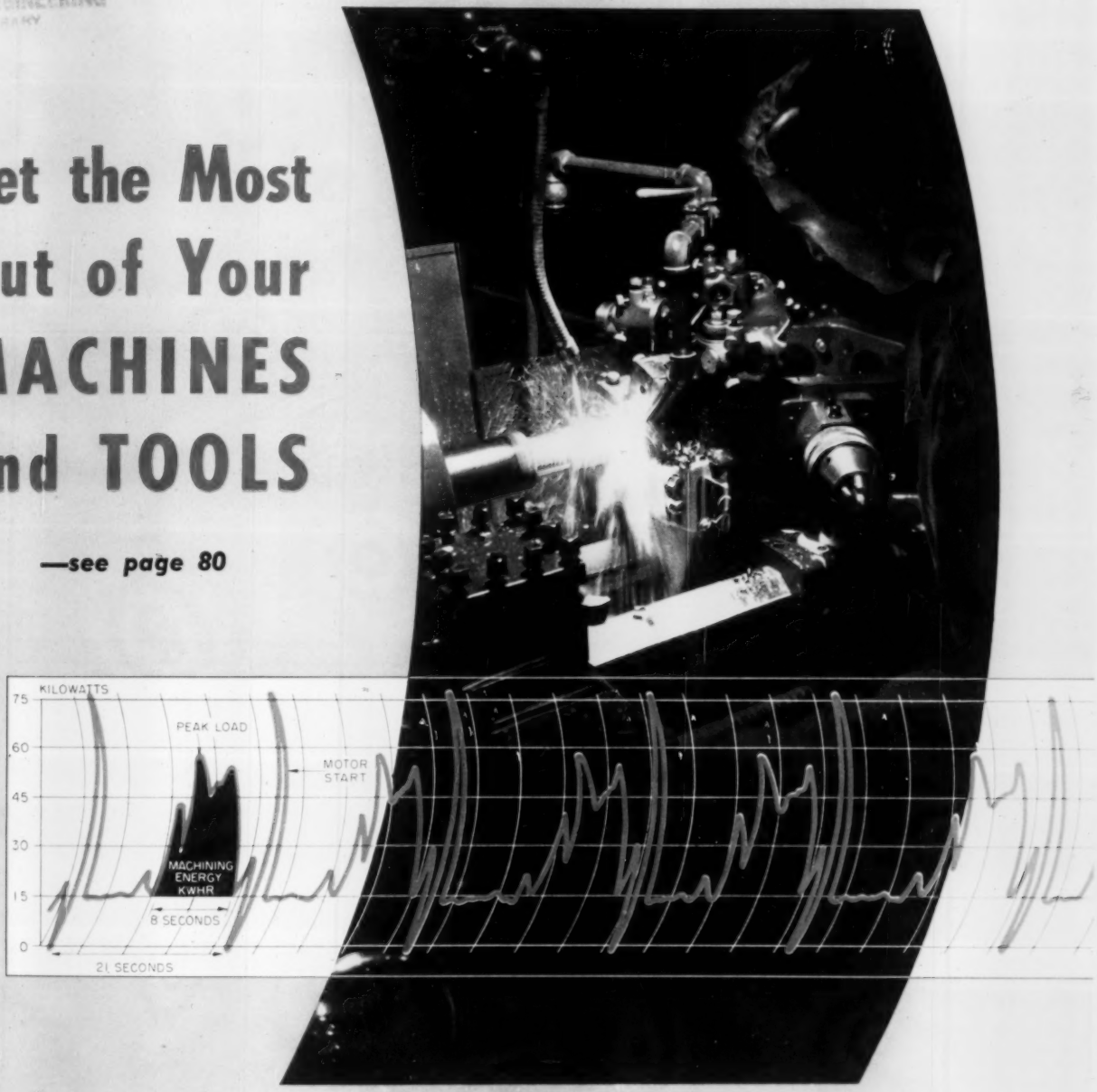
Get the Most Out of Your MACHINES and TOOLS

—see page 80



Answers to Your 'Help Wanted' Problems, p. 61

Plan Your Plant Protection Now, p. 55

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Illustration shows part *hydraulically formed* to precision tolerances from B&W Welded Stainless Croloy 16-13-3 Tubing (type 316). Concentric ends have same diameter and wall thickness of original tubing. Ask your B&W Tube Representative about your tube forming problems. He may help you uncover economies in selecting, ordering and fabricating.

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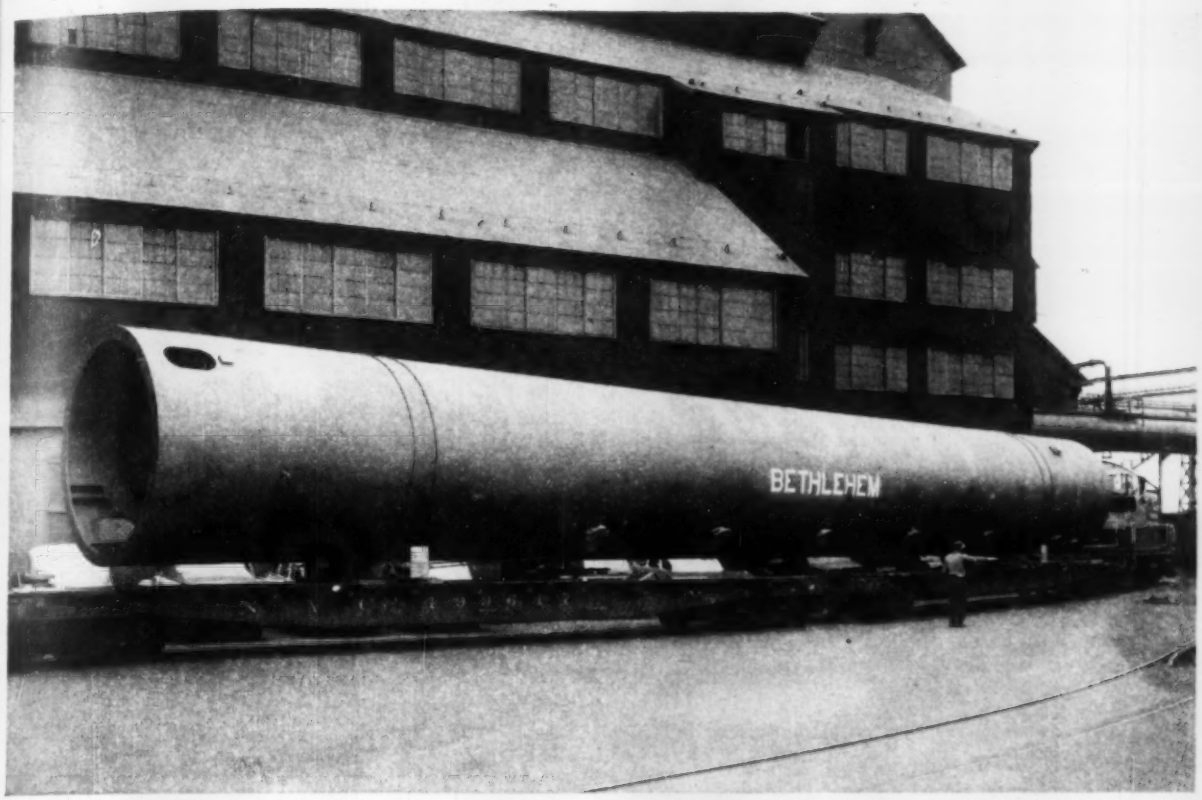
TA-15 3M



BIG WELDMENT

This huge vessel, recently turned out by Bethlehem, is an absorber tower for use in gas-purifying. It is 97-ft long, and 11-ft in diameter, and weighs approximately 33 tons. It was formed from 3/8 in. steel plates, which were joined by welding.

Whether you use big units like this tower, or smaller assemblies or parts, you will find it worthwhile to consider these advantages of Bethlehem Weldments: strength, plus durability, plus a saving in weight.

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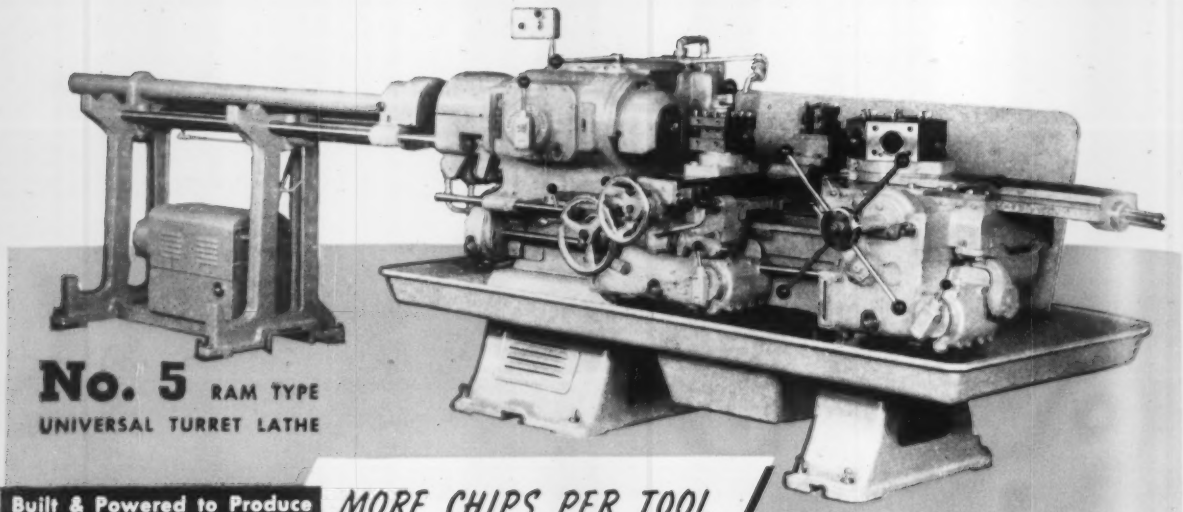
BETHLEHEM STEEL

BETHLEHEM WELDMENTS



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STEEL
The Weekly Magazine of Metalworking

VOL. 128 NO. 11 MARCH 12, 1951

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Next Week . . . **Frozen Mercury Patterns Add Flexibility to Precision Casting . . . Stainless Arc Welded without Columbium . . . Recoilless Rifle Now Built in 105 MM Size . . . Cold Rolling Strip —An Appraisal of Today's Theory and Practice—Part III**

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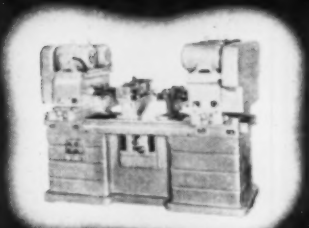
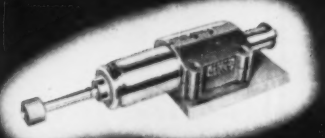
EX-CELL-O for PRECISION



PRECISION MACHINE TOOLS

CONTINENTAL CUTTING TOOLS



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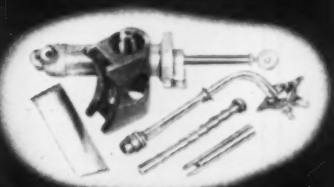
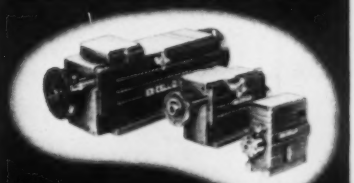


AIRCRAFT AND PRECISION PARTS



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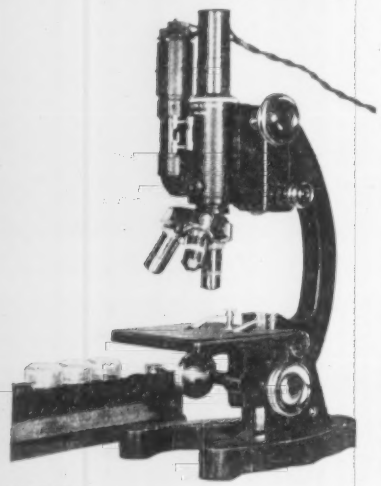

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Behind the Scenes . . .

Cover Story

The cover story this week that begins on page 80 had its beginnings in 1948 when the U. S. Air Force decided to do some research on how to get the most out of machines and tools. Much of this issue's article is based on some of the results of that research.

A committee in 1948 formulated a machinability research program designed to meet Air Force requirements and decided to allocate specific phases of the work to Ford Motor Co., Dearborn, Mich.; Curtiss-Wright Corp., Wood-Ridge, N. J.; Metcut Research Associates, Cincinnati; and Massachusetts Institute of Technology, Cambridge, Mass. The Air Force awarded a contract to Curtiss-Wright for execution of the project which has been under the guidance of Curtiss-Wright President R. T. Hurley.

To get permission to use material developed in the program, STEEL burned up the long-distance telephone and telegraph lines to officials at Curtiss-Wright and Wright-Patterson Air Force Base in Dayton, O., who kindly gave their consent.

Transformation

Know what we mean by "factory rubble heap"? No, not a bombed out plant in Germany or Japan. It exists right here in the U. S. It's the factory dump so common a sight in industry.

We went down to Allentown, Pa. a while back to find the behind-the-scenes story on what one company was doing about the eyesore. Lehigh Structural Steel Co. turned its rubble plot into a park and playground with the help of 40 other Allentown industries, neighborhood youngsters and company employees who donated time.

Lehigh, headed by Tom R. Mullen, did the basic financing, provided equipment and much of the materials. The plot is named the Kift-Mullen Memorial playground after Robert L. Kift, Mr. Mullen's partner for many years, and his son, Tom Jr., who died from automobile accident injuries.

The project was financed through the Kift-Mullen Memorial Foundation. It's a corporation into which is put 5 per cent of the company's annual profits, before taxes, for charitable, educational and scientific purposes.

Tom Mullen is a man with a cause when it comes to that foundation. "Corporate income before taxes was about $35 billion last year," he points out. "If 5 per cent of that went into foundations, there would have been about $1750 million available for worthy purposes. That would serve to reaffirm our belief in the principle of doing things ourselves, as individuals, rather than letting the government take over more and more private responsibilities."

Shifts

As you may have noticed, there have been several changes on the masthead which appears every week on page 10.

Assistant Editors Ed Birkner and Ed Karpick became associate editors. Sam Baker has joined the staff as an assistant editor. He comes from *New Equipment Digest*, another Penton publication. Sam is a graduate of Western Reserve University and has been with Penton since 1949.

Bill Humphries also has joined STEEL. He will be editorial representative in Pittsburgh, replacing Joe Sullivan who becomes Pittsburgh district manager of advertising sales for this magazine. Bill graduated from Carnegie Institute of Technology and is now completing graduate work at the University of Pittsburgh for a masters degree in metallurgy. Until joining STEEL, he was with the sheet and strip sales department of Jones & Laughlin Steel Corp.

Puzzle Corner

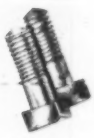
The Feb. 26 violator of the wages and hours act employed 19 men, 1 woman and 80 boys. First in with the correct answers were Donald D. Hook of Henry Weis Mfg. Co., J. Mann of Niagara Platers Inc., Norman A. Osborne of Armco Steel Corp., James S. Miller of Armco Steel Corp., P. W. Snethen of Bethlehem Fabricators Inc., Ernie Infield of United Steel Fabricators Inc., H. C. Osborne of Webster Electric Co. and Alice Shorey of Pittsburgh.

This puzzle is submitted by M. G. Stiegemeier of W. J. Dennis & Co. A square field is surrounded by a board fence. The field has as many acres as the fence has boards. The fence is four boards high and the boards are 12 feet long. How many acres in the field?

Shrdlu

(Metalworking Outlook—Page 43)

Stop Rust Without Oil or Grease



DO YOU HAVE RUST IN YOUR PLANTS?

Do your beautifully machined parts reach your customers pitted with rust? Then send for the NOX-RUST representative. He will show you how other companies in your line have solved their problems. He will recommend products and methods of application that will certainly put the *Indian Sign on your rust problems* and probably save you money to boot. Remember . . . the NOX-RUST representative is a specialist from headquarters for rust preventives.

Have you heard of the *new way of packaging parts and machines* without the use of oil or grease-type rust preventive coatings? Do you know that now you can get metal parts from suppliers that are "factory-fresh" . . . sparkling clean and free of rust or grease? *Send for this important book* of case histories that will show you how others have eliminated slushing and de-greasing problems. No obligation. No cost. It's from Nox-Rust—Headquarters for Rust Preventive products.

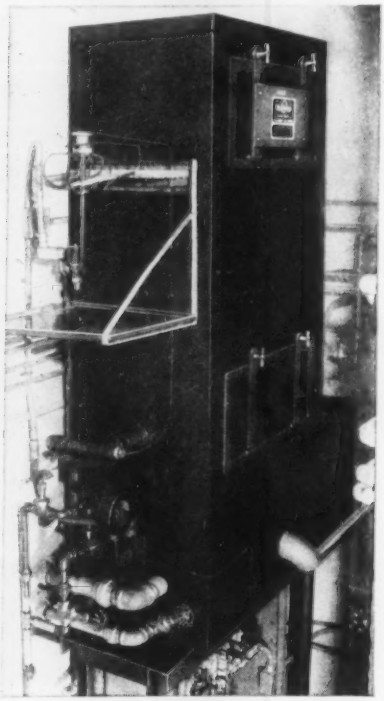
Are you bidding on government orders that require preservative coatings? SEND FOR FOLDER LISTING FEDERAL RUST PREVENTIVE SPECIFICATIONS AND NOX-RUST PRODUCTS CONFORMING TO EACH.

NOX-RUST CHEMICAL CORPORATION

RUST PREVENTION DIVISION • 2471 SOUTH HALSTED STREET • CHICAGO 8, ILLINOIS
PHILADELPHIA • BALTIMORE • DETROIT • SAN FRANCISCO

New "Controlled Humidity" Method Gives a Better Solution to Air Conditioning Problems

"Hygrol" Absorbent Liquid Dehumidifies Fresh Air Without Refrigeration

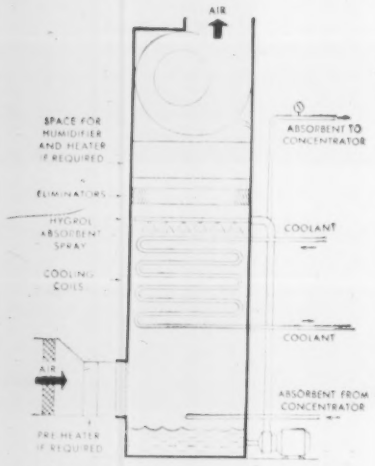


NIAGARA Air Conditioners or Dehumidifiers using "Hygrol" liquid absorbent give precise control of air temperature and humidity . . . at lower operating cost, with large savings in space and with smaller and less expensive equipment, in many applications.

This method dehumidifies the air by passing it through a chamber in which "Hygrol" spray removes its moisture and produces a low dew point. The "Hygrol" solution resulting is continuously and automatically re-concentrated, providing always full capacity in air conditioning and assuring always a constant dehumidifying capacity and a trustworthy, constant condition for your material, apparatus, process or room to be conditioned.

"Hygrol" is a liquid, not a salt solution: it stays pure and non-corrosive: it does not cause maintenance or operating troubles in food plants or in chemical processes.

Investigate this new Niagara Method for "comfort" air conditioning as well as to protect quality in hygroscopic material, or processes or instruments, or to prevent condensation damage to metals, parts or products.



NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM

Write for Bulletin 112

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LETTERS
TO THE EDITORS

Too Cool

Your editorial of Jan. 15, p. 30, reports shipment of an insulated hot forging ingot from our primary steel plant to the Trenton, Nova Scotia, forging plant and notes its temperature on arrival was 1575 degrees. You then state the Trenton Steel Works Ltd., went to work on it without reheating. Such a temperature would be far too low for forging.

Our purpose is to deliver ingots to the reheating furnace at a temperature which will eliminate cracking in cooling and re-heating. In this, we are successful.

C. M. Asser
General Manager
Dominion Iron & Steel Ltd.
Sydney, Nova Scotia

What's Ahead in Steel?

We are interested in the annual steel capacity and production data for the years 1931-1950, on page 121 of STEEL's Yearbook issue. Can you predict these figures for the next five years?

John G. Hummel
Superintendent
Crouse-Hinds Co.
Syracuse, N. Y.

• *By 1952, capacity will be at least 118.7 million tons. Many other expansion projects are under consideration, which, if approved, could raise capacity to 125-130 million tons by 1955. Under garrison state conditions, all available capacity likely will be used.*

Zinc From Galvanized Stock

What companies recover zinc from scrap sheet steel? What practical methods have been developed?

Eugene B. Abbott
Abbott Mfg. Co.
Painsville, O.

• *Bureau of Mines reports little is being done in reclaiming zinc from galvanized steel scrap. In 1948, only 580 tons of secondary zinc was reclaimed from galvanized stock. Write to Bureau of Mines, Department of Interior, Washing 25, D. C., for further information.*

Subcontract Contacts

We are anxious to obtain subcontracting work in the aircraft program. Where can we get information on prime contract awards and successful subcontracts?

Leo Hufschmidt
President
Lansing Co. Inc.
Lansing, Iowa

• *See* STEEL's *summary of selected prime contract awards each week. Also, daily bid information and a weekly synopsis of contracts placed can be obtained from any Department of Commerce Field Office. Air Force procurement field offices can supply names of prime contractors, may give you subcontract leads.*

The Metalworking Outlook

Union of Unions—Not Now

Internal dissension in organized labor is as fierce as ever despite the show of solidarity when union chiefs walked out of the federal defense organization. UAW President Walter Reuther is regarded with suspicion by other labor bosses because his union is the major beneficiary of ESA's conciliatory move in permitting cost-of-living increases in labor contracts (p. 58). A union of unions proposed a year ago by CIO President Philip Murray is as unlikely now as then. Main reason: Big leaders won't sacrifice powers.

Spur for Replacements

If part or all of your business is the manufacture of replacement parts, you're sitting pretty as far as materials are concerned. The 20 per cent cutback on steel for consumer goods in the second quarter (p. 57) doesn't apply to replacement volume. Automotive suppliers particularly hope to hang on to civilian markets by shifting more to the replacement trade.

MRO Order—Of Limited Help

The shift to replacement production gets another nudge from NPA Regulation 4 which permits even non-defense industries to issue DOs in buying for maintenance, repair and operation. Resentment over Regulation 4 is mounting. Consensus in metalworking: "It's an ill-advised order that will become meaningless in a few months. NPA can't possibly police it." NPA says it knows some of the difficulties inherent in the regulation, but the order will be helpful until a Controlled Materials Plan expected by July 1 replaces the whole present controls program.

Mr. Wilson Says, "Slow Down"

Defense Boss Charles E. Wilson has ordered a review of the whole defense expansion program. That's why companies that submitted applications for certificates of necessity early in January have received no action yet. In the case of steel, Mr. Wilson thinks enough certificates have already been granted to assure adequate capacity by the end of 1952. That doesn't mean the end of necessity certificates, but it does mean a more careful scrutiny of applications from now on. Maj. Gen. Thomas F. Farrel has been named deputy administrator of Defense Production Administration for facilities and resources expansion.

Not Enough Ore

Not enough iron ore could be moved now to produce 110 million tons of ingots, says E. C. Smith, chief metallurgist of Republic Steel Corp. During 1951 foreign sources of ore will offer no relief. The new Labrador ores are still some years away, he says, as are the South American ores. But Venezuela may ship more than 1 million tons per year in about 24 months from

Production-Engineering News—p. 79 *The Market Outlook—p. 143*

now. The ore body found in Ontario near the Canadian shore of Lake Ontario will not be ready for mining for some time.

Scraping for Scrap

Expect government action both to control use of and to gather more iron and steel scrap. A record-breaking 61 million tons of the material was consumed in 1950, and the mobilization program then was just getting underway. We could get by if this were a peaceful era, but in wartime the scrap recovery cycle is delayed or thrown completely off balance. In World War II, steelmakers relieved the situation by using more pig iron in the open-hearth melt, but now pig iron is as short as scrap.

Renegotiation—A Stitch in Time

New use for sales personnel: As checkers to determine whether a defense job is renegotiable or not. With World War II renegotiation difficulties fresh in their minds, many manufacturers are determined to keep on top of the subject now. Many tangles dating back to the early 1940s became snarls because metalworking men didn't know what came under the law and years later had to do detective work to unearth details about old contracts which earlier were thought to be exempt.

Credit Drought?

The congressional investigation about the Reconstruction Finance Corp. is alarming metalworking. The query emphasizes the questionable deals but ignores the scores of legitimate helpful loans RFC has made to industry. Industrialists fear the drying up of still another source of credit. It's a good bet that Federal Reserve Board will soon offer a private credit curb plan.

Straws in the Wind

Weirton Steel Co. may build its fourth blast furnace; it's now operating a new 400-ton oxygen plant for blast furnace use . . . The company is test drilling for foundations at its proposed Delaware river plant, and may build finishing facilities first . . . A plant on the southern shore of Lake Erie to smelt and refine nickel from Canada is being considered . . . Electric utilities may not get substantial steel plate deliveries until next fall, too late in the year to continue their expansion programs.

What Industry Is Doing

Ferrous foundries are producing at record rates despite material shortages, but deliveries are still extended from two to four months (p. 51) . . . A Republic official believes steel supply and demand will balance by the end of 1952 (p. 52) . . . Some $87 billion in defense expenditures of the $123 billion already appropriated for fiscal 1951 and 1952 will benefit metalworking (p. 53) . . . A priority program is developing to aid companies expanding for defense (p. 56) . . . Russia has access to all the raw materials it needs for an industrial economy (p. 63).

Wilson Deserves Support

If it were likely that the feud between union leaders and President Truman and Defense Mobilizer Charles E. Wilson will be settled on the basis of merit, there would be nothing to worry about. The President and his chief aide would win easily.

Unfortunately, the situation is complicated by factors other than merit. The unions are set for a long campaign in which they are hoping to capitalize upon the American trait which causes most people to be resentful of government controls. They are banking on the assumption that the wage and price stabilization—administered without the benefit of union co-operation—will bog down and that after it has become hopelessly messed up, union leaders will be called in to assist in a new effort at controlling wages and prices.

This boycott by the unions places Mr. Truman in a hot spot. To date he has backed Mr. Wilson to the limit. No doubt in his own mind he intends to continue to back him. Unfortunately, circumstances may cause him to act differently. It is significant that practically every Washington information service predicts that in the ultimate showdown, the President will yield to political pressure and Mr. Wilson will be out.

If this should happen, it would be a major disaster. One reason why it might happen lies in the unhappy circumstances under which Mr. Wilson, Eric Johnston and other able businessmen are obliged to work. They are trying to accomplish miracles in a government administration that has weak leadership, is tainted with petty graft and is charged with such palpable ineptitude on so many scores that it has lost the confidence not only of the American people but of the world at large.

Obviously, Mr. Wilson's chief hope for survival will lie in his ability to demonstrate to Congress and to the public that his mobilization program is succeeding in spite of the sordid conditions so prevalent in some other phases of Washington activity. His is the challenge to win confidence in the government activity which he heads. He deserves the help of every constructive-minded person.

E. L. Shaner

EDITOR-IN-CHIEF

BEWARE OF SABOTAGE: Many metalworking executives believe that in times like the present, preparedness against attempts to destroy or damage plants and equipment by sabotage is just as important as fire insurance in normal times. American Steel & Wire Co. has created a works defense committee which has compiled a manual dealing with prevention of espionage and sabotage, blackouts, air raid shelters, training personnel, demolition, main-

tenance, fire fighting, first aid and other pertinent precautions.

This manual is so comprehensive that to date 100 other industrial companies have requested copies to help them plan their own works defense programs. Companies whose plants are engaged in defense work will do well to plan now for adequate precautions against trouble. A number of companies have found it advisable to include in their works defense committees at least one man who has had FBI experience. Other suitable members are the safety director, medical director, personnel director and industrial relations officer. —p. 65

FOUNDERS ARE BUSY: American ferrous foundries are operating at record rates. Gray iron casting plants can deliver orders in two to three months; malleable and steel foundries in three to four months. Materials shortages plague foundrymen, nevertheless most of them don't want pig iron, coke or scrap allocated. They think their suppliers are doing a good job, considering the circumstances.

The problem of conversion from a peacetime to wartime basis is not serious for many foundries. Output of most malleable and steel shops goes to essential users. In the gray iron group, the principal adjustment falls upon the shops which have been furnishing a large percentage of output to the automobile and household appliance field. Gray iron foundries catering to the machine tool industry have no conversion problem.

Most serious foundry headache is shortage of alloying elements. Steel foundries, particularly, are handicapped by scarcity of chromium, molybdenum, columbium, titanium, nickel, copper, cobalt and tungsten. —p. 51

IN INFLATED DOLLARS: Annual report of General Motors for 1950 shows net sales of $7½ billion, resulting in net profit of $834 million, or 11.1 per cent of sales. In some quarters there is a disposition to place undue emphasis upon the magnitude of profit, as if it were the most important thing to be considered.

Breakdown of the sales dollar helps to place the profit factor in proper perspective. Of each dollar of sales, 46¾ cents went to suppliers for materials and services; 25¾ cents went to employees; 15 cents went to federal, state and local governments; and 1½ cents went for depreciation and obsolescence of plants and equipment. The remaining 11 cents was profit, of which 7 cents was paid to stockholders and 4 cents was retained in the corporation.

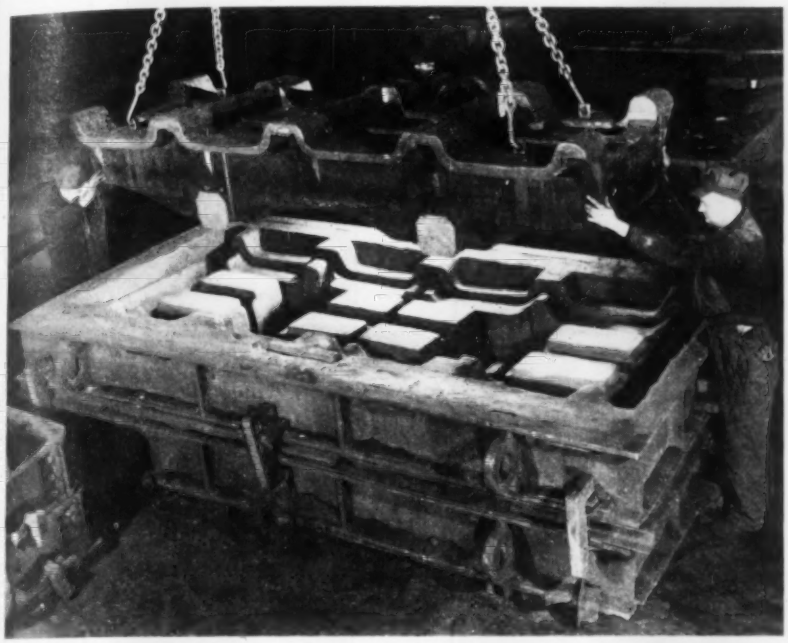
GM's profit was unprecedented, but its payments to other corporations, to employees and to tax collectors also were unprecedented. Remember—all of these figures are expressed in terms of inflated dollars. —p. 65

VAPOR PREVENTS RUST: A new packaging technique has been developed which may save considerable time, money and inconvenience for shippers and receivers of metal parts which must be protected against rust. The parts may be loosely wrapped in a kraft paper which has been coated with a new chemical VPI (vapor phase inhibitor). The chemical slowly vaporizes, permeating the air surrounding the parts and enveloping them in an invisible protective film.

Protection by wrapping in VPI paper is so effective that in many instances this method will do away with the costly practice of applying and later removing heavy rust-preventive coatings, sludging and oil spray on metal parts. For long-term protection, escape of chemical vapor can be retarded by enclosing the VPI paper parcel in an outside coated barrier wrap. —p. 100

OPTIONS IN CARBIDES: Of the tens of thousands of persons in the metalworking industry who realize the extent to which sintered carbide metalcutting tools have brought about a revolution in industrial production, only a small minority appreciate the progress that has been made in recent years and realize that a new technology of the cutting process has been evolved which calls for more careful attention to the proper application of carbides to various types of work.

Each of the several sources of carbide tool materials offers from six to 12 grades from which to choose. The carbides are produced by powder metallurgy and composition can vary widely. Factors such as grain size, sintering temperature and production controls can lead to infinite combinations of physical properties. These variables make it highly desirable for users of carbide tools to exercise discretion in selecting the right grade for each specific job. —p. 113



Castings are holding to record production pace but . . .

Going Gets Rougher for Foundries

Materials shortages are putting the crimp on delivery dates of gray iron, malleable and steel castings. Most foundrymen don't want allocations of pig, scrap or coke

FERROUS foundries are producing at record rates despite materials shortages, but deliveries are still extended from two to four months.

Gray iron castings users have to wait from two to three months to get their material, but malleable and steel castings shipments are even more extended—three to four months. The delivery situation isn't likely to improve soon because pig iron, coke and alloying elements are becoming harder to get. Scrap is a problem, too, but most pressing for the steel foundries.

Good Job—Most foundrymen don't want pig iron, coke or scrap allocated because they think that suppliers of those materials are doing a good job considering the circumstances and that a priority system would merely confuse the situation. Alloying elements are a different matter. Steel foundries particularly are critically short of chromium, molybdenum, columbium, titanium, nickel, copper, cobalt and tungsten; most of those foundries want allocations.

About 20 to 25 per cent of the average foundry's business bears a DO priority, but the percentage is expected to increase rapidly, especially when castings consumers begin inaugurating their own DO orders for maintenance, repair and operation (STEEL, Mar. 5, p. 51). Some foundries have as much as 65 per cent of their volume on priorities. Others have no rated business.

No Conversion Problem—Most defense volume thus far parallels civilian business. Gray iron shops, which are doing relatively less war work than malleable or steel foundries, find most of their DO orders are from manufacturers of machine tools, electrical fittings, pumps and auxiliary equipment. Most DO jobs for malleable shops are for trucks, freight cars and agricultural equipment. Steel foundries have the bulk of their DO work for tanks, transportation equipment, trucks, machine tools, heavy machinery and earthmoving equipment.

Malleable and steel shops say their castings normally go almost entirely to essential users, so they expect a minimum disruption when nonessential industrial lines are curtailed. Gray iron foundries have a more serious problem because much of their business is for automobiles, home appliances, metal furniture and similar purposes. Thus far, their business in those lines has been brisker than ever.

Paradox—Oddly enough, an area where the defense business for foundries is the lightest is around Detroit. That's because many shops there are loaded with the auto industry's 1952 die program. The auto body die contracts are going along thus far completely untouched by the nation's defense effort.

Foundries around Detroit have relieved the pig iron shortage by occasionally buying the higher priced Canadian material. Shops along the East Coast have been helped by European pig iron and scrap, but that source is shrinking as European foundries increase production.

Alloying Elements Short

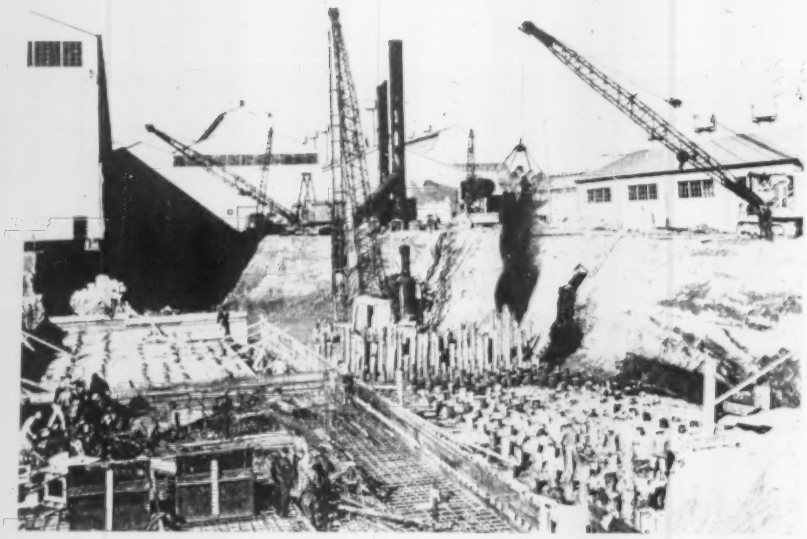
The high alloy castings industry is being surveyed to determine what its materials problems will be in the next two months. That industry produces heat or corrosion resistant castings containing 8 per cent or more nickel or chromium, less than 1 per cent carbon and 6 per cent copper.

The most critical element by April, according to present indications, will be molybdenum. Foundries anticipating difficulty in obtaining sufficient supplies are being advised by Alloy Casting Institute, Mineola, N. Y., to write ferroalloys section, Iron & Steel Division, NPA, explaining their situation. They are asked to tell NPA their normal use of molybdenum during the first six months of 1950; their proportion of moly-using orders, rated and unrated, scheduled for production in March; end-use of unrated orders; present inventory of molybdenum; weight of molybdenum scheduled for delivery this month; and amount additionally needed and how soon required.

ACI is asking them to submit figures on their castings output, by consuming industries and by amount of alloying elements required.

Gray Iron Price Unit Formed

A 14-man gray iron foundry industry advisory committee has been appointed to meet with and advise Office of Price Stabilization officials on matters relating to the preparation, issuance, and modification of price



FIRST STEP: Foundation of a new sheet and tin mill is being laid by Columbia Steel Co. in Pittsburg, Calif. This subsidiary of United States Steel Corp. will increase West Coast production of sheet and tin plate by about 215,000 net tons annually. The new plant will have underground control rooms and is scheduled for completion early next year

regulations and orders in the gray iron field.

Steel Balance by 1952?

Republic official believes supply and demand will equalize then even if military needs continue

SUPPLY and demand in the steel industry may approach a balance by the end of 1952, barring runaway inflation or an increase in defense needs to the peak level of World War II requirements, says P. J. Sandmaier, manager of Republic Steel Corp.'s commercial research division.

"Right now," he says, "we have available for civilian use about 58 million tons of finished steel per year. Even if military requirements should reach the heights of World War II, we still would have 40 to 48 million tons left for civilian use." Current military commitments are for 17 million tons of steel a year. The peak demand during the war was for about 40 million tons. Republic expects that the maximum military requirements now will be for 24 million tons.

Calculations—Mr. Sandmaier bases his report on the current and forthcoming expansion of American steel-producing facilities, plus the improbability of defense needs exceeding peak World War II demand. Then, America's shipbuilding program consumed 10 million tons of steel a year, and 6 million tons of steel went to lend-lease.

Neither shipbuilding nor lend-lease programs of that magnitude are anywhere in sight now despite obligations to the Atlantic Pact nations.

To meet mounting military and essential civilian needs, the Republic official says, the industry's ingot capacity will be further increased by 15 million tons annually by the end of 1952. "Steel's ingot capacity should approximate 120 million tons by the end of 1952, compared with 82 million tons in 1939. That increase amounts to more steel than Russia and her satellites have today."

Nip and Tuck—With an expected ingot capacity of 120 million tons coming up in 22 months, we have a good chance to satisfy a "substantial" portion of the civilian demand, Mr. Sandmaier believes. "The steel industry knows that demand for steel will keep on growing after the defense program is over. That's why the most ambitious plan for expansion ever undertaken is now well under way."

NPA To Study Steel Programs

NPA's Iron & Steel Division asked the Interior and Agriculture Departments to present their steel programs quickly so they may receive early consideration.

Involved are the requirements for the oil and gas industry, the mining industry, electric power generating plants and facilities, and agriculture. Whether or not the steel called for in these programs will be allocated will be determined after the figures have been studied. In case of allocations, tonnage would be called for only up to July 1, after which requirements of this character will be handled under the Controlled Materials Plan.

Sharon To File for Amortization

Sharon Steel Corp. probably will file for certificates of necessity for an additional $7.5 million worth of projects. It already has received certificate permission to write off in five years for tax purposes $2.3 million worth of new facilities.

In its 50th annual report, Sharon reveals 1,448,978 tons of ingots were poured in 1950, an alltime record. 1,001,625 tons were produced in 1949. Shipments of semifinished and finished steel products totaled 1,047,795 tons, compared with 738,584 tons the year before.

Blast Furnace Output High

The nation's blast furnaces turned out 5,894,403 tons of pig iron, ferromanganese and spiegeleisen in January. That was the highest since last October when 5,924,427 net tons were produced. Output in December was 5,693,033 tons, in January, 1950 5,293,596 tons.

Revised figures for ingots in January put the record production at 8,843,167 net tons.

Army Ordnance To Exhibit

The Army Ordnance Department is setting up contractor exhibits at its 11 district offices throughout the country. The exhibits will include samples, display boards, photographs and other essential manufacturing information pertaining to ordnance items.

Displays will be set up at 734 Frank Nelson Bldg., Birmingham; 35 N. Raymond Ave., Pasadena, Calif.; Oakland Army Base, Oakland, Calif.; 1660 E. Hyde Park Blvd., Chicago; Boston Army Supply Base, Boston; Springfield Armory, Springfield, Mass.; 6301 W. Jefferson Ave., Detroit; 4800 Goodfellow Bldg., St. Louis; 111 E. 16th St., New York; Sibley Tower Bldg., Rochester, N. Y.; Big Four Bldg., Cincinnati; 1367 E. Sixth St., Cleveland; Frankford Arsenal, Bridesburg Station, Philadelphia; and 310 Old Post Office Bldg., Pittsburgh.

While the need is not immediate for all the items which will be displayed, potential contractors may become familiar with present and future requirements. The displays also emphasize that contracts are negotiated in the district offices, not in Washington.

Tool Order Plan Shaped

It will work out in practice differently than NPA thought, but it will still speed deliveries

THERE'S widespread misunderstanding of how the new machine tool order program will work, as authorized by NPA orders M-40 and M-41.

The government's explanation of how its regulations are expected to function (see STEEL, Mar. 5, p. 51) probably will not be followed in practice. Here's how the plan is likely to pan out:

The Low-Down—General Services Administration will estimate machine tool requirements for the defense program on the basis of plans of the Defense Department. GSA will set up an order board which will reveal the status of demand in the tool industry, and to this will add its ordering program in the most critical machines for some months to come. From that board, builders can get an idea of the quantity of machines required.

Builders can line up their subcontractors and submit prices. When they get an order (probably not until after Apr. 1), a priority for materials accompanies it and the builder can obtain the materials and components necessary for the lot of defense tools. The prime advantage of the system is that it permits the builder to get priorities on materials and to build the defense tools in lots rather than individually.

Heretofore, DO orders have been coming singly or for only a few of the same machines at a time. The builder must manufacture in larger lots to operate economically and those single DO orders aren't much help in getting the materials for an entire lot which might include 49 unrated tools and only one rated.

Misnomer—The term "pool" for the machine tool ordering system is ambiguous because GSA will acquire no backlog of machine tools in warehouses. Virtually every tool it orders will find the user waiting for it. The idea of the system is to cut down that wait.

Unlike the setup in World War II, no advance cash payments will accompany the pool orders. In World War II, a 30 per cent advance payment was permitted. Now, the builder must finance the manufacture of the defense lot himself, as he normally does with civilian lots. But if the bottom does drop out of the defense business, the builder has the right to place a claim with GSA to reimburse him for the unfinished business.

Tool Builder Won't Quote Prices

Warner & Swasey Co., Cleveland, will no longer quote prices on new machine tools until it can get some clarification of the price situation, says President Charles J. Stilwell.

The company currently is taking orders for delivery of machine tools in the third and fourth quarters of 1952, he says. "But we are limited on price to a previously established base period. While we can predict costs in the immediate future, we have no way of knowing what our costs will be at the end of next year. As a result we may find ourselves selling at prices below production costs."

The company will continue to take orders from customers and place them in the usual production schedule but it will not make a contract to forward machines until the price order is clarified.

Equipment Survey Asked

Associated Equipment Distributors wants a nationwide survey of construction machinery and trained personnel to determine "the nature and ownership" of available construction equipment and location of trained operators.

The information to be collected in the proposed survey would be "indexed and made available to authorized Civil Defense Authorities on the national, state and municipal levels."

IBM Poughkeepsie Plant Booms

The Poughkeepsie, N. Y., plant of International Business Machines Corp. will nearly double in size under a new manufacturing expansion program. Two new three-story structures will add 632,000 square feet of floor area necessary for fulfilling of defense commitments to be undertaken by IBM.

Billions for Defense

Seventy billion to benefit metalworking companies in next 15 months

DEFENSE expenditures will total at least $123 billion in fiscal 1951 and 1952. The bulk of this, $87 billion, will go for goods and services produced by the metalworking and related industries.

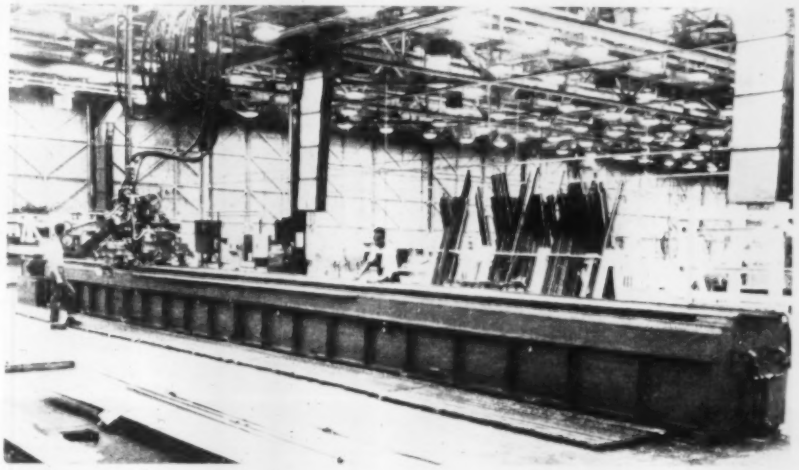
Those figures, obtained exclusively by STEEL, will offset cutbacks in civilian goods production necessitated by material and manpower shortages.

The $87 billion expenditures affecting the metalworking industries will be spent largely for procurement of materials and equipment, plant expansion, tooling and construction.

The Lion's Share—Only $16.4 billion has been spent or obligated for procurement, expansion, tooling and construction to date; $70.6 billion remains to be spent or obligated by June 30, 1952.

Although details of the procurement program are partially restricted, expenditures so far have been mostly for combat vehicles and aircraft. These programs are the most advanced. The $70.6 billion still to be spent in the next 15 months will go for such items as electronics and communications equipment, ships, noncombat vehicles, plant expansion, tooling up plants, military public works, ammunition and weapons and the mutual defense assistance program.

Bigger Yet—Supplemental pro-



LONG TOM: This new Farnham Utility Mill is designed for use in aircraft production where close-tolerance machining of extrusions, sections and billets of aluminum or other nonferrous metals is required. Farnham Manufacturing division of Wiesner-Rapp Co. developed the precision machine

grams to increase the total defense spending are likely to be developed.

New Mill for California?

Considerable mystery, to say nothing of skepticism, has been aroused by an announcement of plans for the building of a $300 million steel mill in central California.

The announcement was made by a director of Yolo Iron & Metal Co., incorporated last month in Nevada. The operation is said to have a goal of 1 million tons of steel a year, the first of it to be for armor plate and other heavy materials for the government.

The director said the Yolo venture has obtained options in northern California's Lassen county, calculated to yield 200 million tons of ore running better than 50 per cent in iron content. The company intends to draw its coal supply from deposits in Mendocino county.

Otherwise, details are vague. This may be due to the desire of Yolo officers not to say too much until a certificate of necessity has been obtained from the National Production Authority.

A California Bureau of Mines spokesman in San Francisco said the bureau has no record of a ferrous oxide bonanza in that section of the state. Also an official of a large steel company in the same city declared that his company had combed that area thoroughly and had found no such deposits.

A mining engineer said he had not heard of development of a method for converting Mendocino coal into coking coal.

Inland Booms in Milwaukee

The Milwaukee plant of Inland Steel Products Co. is scheduled to undergo a two-year $2½ million modernization and expansion. Practically no working time will be lost during construction and changeover to new facilities.

Approximately 175,000 square feet will be added. Most of the new building will be of one-story glass and steel construction. A new power plant will be part of the addition.

The extra space and improved facilities are expected to boost manufacturing capacity 50 per cent. The program is being speeded up to allow handling of more defense work, including a $4 million order for aircraft landing mats received late in February.

Interlake To Spend $11 Million

Interlake Iron Corp., Cleveland, will spend about $11 million in a two-year expansion program now underway. Plants at Chicago, Duluth, Toledo and Erie will be improved and enlarged.

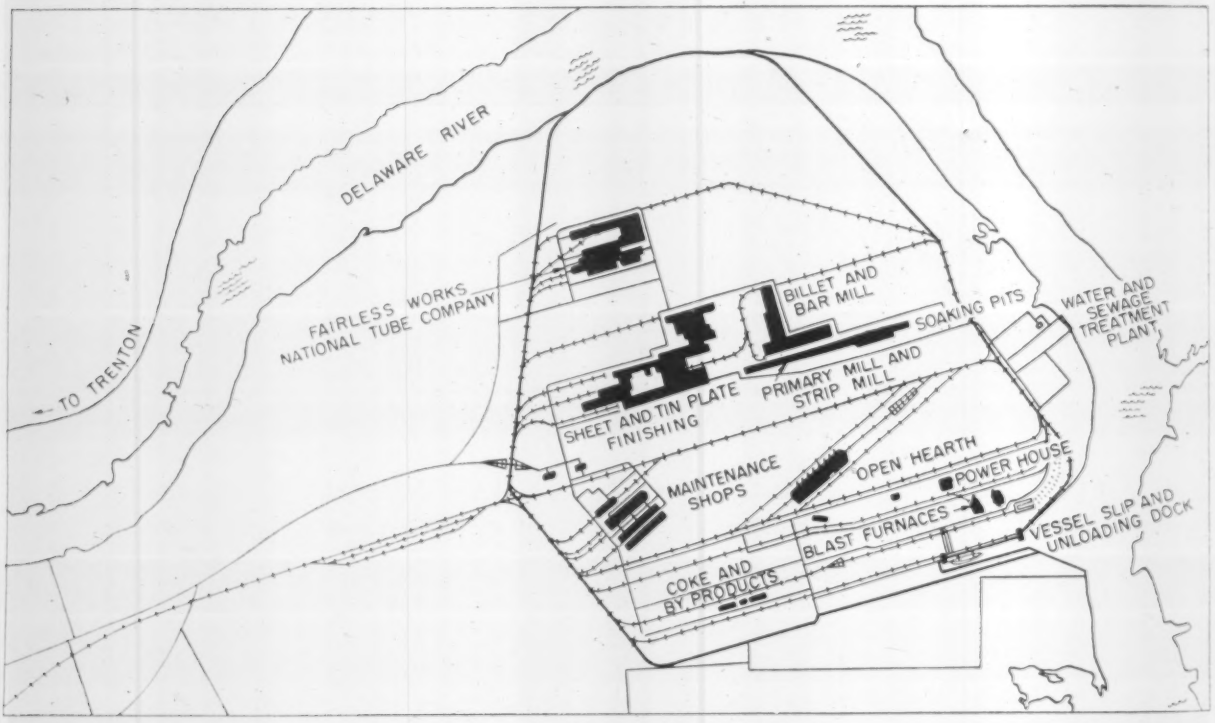
A new battery of coke ovens will be constructed in Erie to replace the original 37-oven battery. Improvements are being made at Interlake's Toledo blast furnace to boost output by about 36,000 tons a year. An additional battery of coke ovens will be installed at Toledo also.

The Chicago iron ore storage dock of Interlake's Federal Furnace plant will be enlarged and provided with new ore bridges. A road tar distillation plant will be built in Toledo and an ammonium sulphate plant at Chicago. A battery of 20 coke ovens was put in operation at Duluth last year.

Pratt-Whitney Grants License

Continental Aviation and Engineering Corp., Detroit, will take over all U. S. production of the Pratt & Whitney 600-horsepower Wasp piston engine for military aircraft. The license, granted by Pratt & Whitney Aircraft division of United Aircraft Corp., will extend for the duration of the present emergency.

Other builders of P&WA engines include Ford Motor Co., producing the 3800 horsepower Wasp Major, and Chrysler Corp., which will build the J-48 Turbo-Wasp and afterburner in a new plant near Detroit.



MAPPED OUT: Location of mills and various facilities of United States Steel Corp.'s new Fairless Works at Morrisville, Pa., is shown here. Most of the facilities will be operated by United States Steel Co., but a new mill for producing pipe will be run by another U. S. Steel subsidiary, National Tube Co.

Guard Your Plant

Works defense programs readied to protect against sabotage, bombings

DO YOU have a works defense program to protect your plant against sabotage or other enemy action?

Many metalworking executives, realizing the possibility of large-scale war, are formulating plans and training personnel in the prevention of damage to plant facilities by saboteurs, minimizing the effects of possible bombings and co-ordinating the plant's defense program with the community program.

Calculated Preparedness—This is not a flag-waving stunt, but a recognition that attempts may be made by the enemy to destroy or seriously damage factories producing essential war goods. Works defense planners readily admit their programs may not be needed, but they argue that defense preparedness is just as sensible as fire insurance.

Several hundred companies have prepared or are preparing manuals on works defense. These are used primarily in training supervisors, guards, wardens, firemen and special defense personnel.

What One Company Does—Soon after hostilities started in Korea, American Steel & Wire Co., Cleveland, named a works defense committee. Members are: E. O. Kumler, safety director; Dr. A. M. Edwards, medical director; Alex C. Davidson, former FBI agent and now supervisor of industrial relations; and C. F. Gaking, of the training division.

Committee's first task was preparing a manual outlining a works defense organization and assigning responsibilities. Prevention of espionage and sabotage, blackouts, air raid shelters, training personnel, demolition, maintenance, fire fighting, first aid and many other subjects are covered. So comprehensive is the manual that more than 400 other industrial companies requested copies to help them plan their own works defense program.

Trainers' Conference—American Steel & Wire last week called safety directors and other representatives of its 17 plants to Cleveland for a three-day training session. How to detect and prevent sabotage was explained by Mr. Davidson. Models of company buildings were blown up, set afire and otherwise "attacked by the enemy" to demonstrate the defense problem. Experts on fire fighting, espionage, bomb demolition, decontamination, plant maintenance and demolition, and similar subjects explained the training of plant personnel to fit into the defense program. Training of plant guards was outlined by Ray Abbaticchio, FBI agent-in-charge at Cleveland.

Third Step—The program now will be carried to the various plants where plant personnel will be instructed and drilled in their defense functions.

Wide World

GOOD AS NEW: Among weapons being restored for shipments to Atlantic Pact nations is this multiple rocket launcher, undergoing reconditioning at the Rock Island, Ill., arsenal. Rockets can be fired singly or 24 at a time by this weapon

More Women Flow Into Industry

Women are being drawn into the manpower pool at an increasingly swift rate, Department of Labor statistics reveal. Nonfarm placements of women by Federal-State employment offices rose sharply in January to 196,100, up 23 per cent compared with only 11 per cent gain by men.

Total job placements were approximately 573,700, the largest January volume since 1945. Of this number only 87,000 were in agriculture. An 11 per cent overall placement drop from December was due to fewer farm openings.

Volume of new applicants in January jumped more than 40 per cent over December, due mainly to seasonal factors, but also to increased manpower needs of defense plants and service industries. Women filed 311,100 applications in January, a 60 per cent gain over December and the highest January volume since 1946. New male applicants numbered 472,100, a 32 per cent rise.

Even the number of physically handicapped seeking work increased nearly 20 per cent to 21,700 in January. More than 11,200 disabled veterans were placed during the month.

The 'Up' Escalator

Companies with escalator clauses are granting pay hikes of 5 cents an hour

AUTOMOTIVE and other companies with "escalator" clauses in their union contracts are falling into line, granting pay hikes of five cents an hour to hourly workers and $25 a quarter to salaried employees. The increases follow publication of the Bureau of Labor Statistics cost-of-living index for the quarter ended Jan. 15. More than one million UAW-CIO members are affected. The electrical industry is also covered.

Rough Road—The automatic adjustment of pay rates, based on the cost of living, ran into snags from two directions before they could be granted. First was over the question of its status under the wage freeze. This was settled by Economic Stabilizer Eric Johnston's decision that existing escalator and productivity clauses will be valid until July 1 even where such increases result in pay raises in excess of the 10 per cent allowable increase since Jan. 15, 1950.

The other big question mark was raised by BLS' issuance of two indexes . . . its "official" index and a revised index which includes for the first time computation based on rents on new buildings, latest population figures, and 25 new items which play a part in today's living habits—frozen foods, television, beer, group hospitalization, and the like.

Good for a Nickel—The new "interim" index was discarded in favor of the old index with a rent "bias" correction added. Had the new index been used only 4 cents an hour additional would have been paid. Using the old index, which reached 181.6 per cent of the 1935-1939 base, and adding 0.8 points for the rent factor, the companies raised the cost-of-living allowance 5 cents an hour.

Provision is being made for an orderly change-over to the new index when and if it supplants the original index on which existing contracts are based. If any disparity exists between the two indexes the disparity will be corrected so that the transition between old and new index will be made with no change in the amount of cost-of-living allowance. It is understood BLS will report both indexes throughout this year.

June Review—Next review of the allowance will be made in June following issuance by BLS of its index for Apr. 15. Meanwhile, raises of 4 cents an hour become effective May 29 and after for companies having

General Motors-type contracts providing for an annual improvement factor.

Proponents of escalator-type contracts stoutly maintain they are not in themselves inflationary, that pay changes follow, not cause, price changes. The foremost campaigner, Walter P. Reuther, has carried on a successful fight thus far to make sure that this is recognized and that the contracts remain intact.

Too Many "Wooden" Nickels—He admits, however, that higher pay is not an effective remedy for inflation. He suggests a roll-back in living costs to the pre-Korean level and a leak-proof freeze at that point. This achieved, he promises the UAW will "accept a corresponding roll-back in wages that have been increased during the last six months through cost-of-living escalator clauses." Characterizing these increases as paid "in the wooden nickels of inflation," and offering no protection against depreciation of life insurance, savings and war bonds, he states that each 1 per cent rise in the BLS index costs the American public $2 billion.

Expansion Aid Studied

NPA IS developing a formal program to give companies expanding for defense priority assistance in getting new equipment and construction materials.

Broader Program—Up until now, NPA has given individual spot help, particularly to steel and aluminum companies, when expansions threatened to bog down and when the company asked for it. Soon, a form questionnaire will be developed that any firm expanding for defense can fill out and use as a guide in preparing its case for priority aid.

It will be up to the company involved to take the initiative and present its arguments to NPA. If NPA agrees, a DO number will be granted the company, enabling it to get any equipment and construction materials it needs. Any kind of industrial company can apply for aid, as long as its expansion is for defense. It will be up to the individual company to work up its own purchasing schedule for the expansion in question.

A Push—NPA won't say so, but one factor which may speed DO approval will be the prior granting of a certificate of necessity enabling the company to write off its expansion for tax purposes in five years. But necessity certificates, as such, carry no DO powers.

That priority aid program probably will be effective only until July 1 when the Controlled Materials Plan is to be inaugurated.

Prime Awards Multiply; Ford Is Tops Again

STILL looking for defense subcontracts? Opportunities for them continue to mount as the volume of government-awarded prime contracts swells.

For the second consecutive week Ford Motor Co. stood out prominently in the prime contract picture by receiving another important letter of intent, which brought its defense awards to nearly $1 billion. The latest commitment is valued at $195 million and calls for production of medium tanks at a plant planned for construction in the Detroit area. E. R. Breech, Ford executive vice president, estimates Ford will need 12,000 employees to man defense work alone when production on all its government jobs is underway.

Two more letters of intent went to Rheem Mfg. Co., New York, for manufacture of mortar shells. These commitments totaled $10.3 million, reports C. V. Coons, vice president. Rheem plans shell production at its Houston plant and will employ about 575 workers from that area.

Prime contract awards likely to be of interest to those seeking subcontracts are included in STEEL's weekly selected summary.

Product	Quantity	Value	Contractor
Aircraft Energizers	200	$520,000	General Electric Co., Schenectady, N. Y.
Minesweepers (138 ft)	3	2,500,000	Harbor Boat Building Co., Los Angeles
	3	2,500,000	Henry B. Nevins Inc., New York
	2	1,500,000	Quincy Adams Yacht Yard Inc., Quincy, Mass.
	3	2,500,000	Henry C. Grebe & Co. Inc., Chicago
	2	1,500,000	Burger Boat Co., Manitowoc, Wis.
	3	2,500,000	Consolidated Ship Building Corp., New York
	3	2,500,000	James Russel Engineering Works Inc., Boston
Minesweepers (57 ft)	4	282,400	Tacoma Boat Building Corp., Tacoma, Wash.
	5	1,000,000	Simms Bros., Dorchester, Mass.
	4	1,000,000	John Trumpy & Sons Inc., Annapolis, Md.
	5	1,000,000	South Coast Co., Newport Beach, Calif.
Barges	4	1,000,000	Frank L. Sample Jr. Inc., Boothbay Harbor, Me.
Diesel Repair Parts	1,570,368	7,189,729	General Motors Corp., Diesel Div., Cleveland
	477,298	929,513	American Basch Corp., Springfield, Mass.
Oxygen-Nitrogen Plant	6	350,000	Union Carbide & Carbon Corp., New York
Camera Control System		510,000	Bill Jack Corp., Solana Beach, Calif.
Fuel Filter Kits		453,635	Bendix Aviation Corp., Detroit
Generators		353,925	Ideal Electric & Mfg. Co., Mansfield, O.
Coolers (stationary)		446,876	Carrier Corp., Syracuse, N. Y.
Die Forging & Extrusion Presses		10,932,052	Loewy Construction Co. Inc., New York
Timers		135,359	Morse Instrument Co., Hudson, O.
Ignition Analyzers		618,000	Sperry Corp., Long Island, N. Y.
Fire Detection Kits		415,757	Thomas A. Edison Inc., East Orange, N. J.
Wheel & Brake Assemblies		403,370	Goodyear Tire & Rubber Co., Akron
Trainer—Radar Sets		3,905,000	Transducer Corp., Boston
Gyro Indicators		1,250,000	Minneapolis-Honeywell Regulator Co., Minneapolis
Alternators & Regulators		663,076	Elcor Inc., Chicago
Power Units (weapon sights)		1,000,000	Sorenson & Co. Inc., Stamford, Conn.
Starters		635,095	Jack & Heintz Inc., Cleveland
Gyro Assembly Repair Parts		1,448,195	Schwein Engineering Co., Los Angeles
Aircraft Assemblies & Parts		4,000,000	North American Aviation Inc., Los Angeles
Target Aircraft & Autopilots		16,196,000	Radioplane Co., Van Nuys, Calif.
Model Airplanes		12,000,000	Douglas Aircraft Co. Inc., Santa Monica, Calif.
Aircraft Coolers (portable)		759,924	Keco Industries Inc., Cincinnati
Heaters (engine & shelter)		1,316,778	Surface Combustion Corp., Toledo, O.
Constant Speed Drives		310,000	Sunstrand Machine Tool Co., Rockford, Ill.
20 mm. Ctgs., in M21 Cans	7,318,000	204,930	Connelly Containers Co., Philadelphia
Gun Sights	various	619,647	Graflex Inc., Rochester, N. Y.
Artillery Fire Control Systems	564	2,000,000	ATF Inc., Elizabeth, N. J.
Slides (M2 Carbine)	200,000	1,712,043	General Motors Corp., Saginaw, Mich.
Metal Parts (M75 Fuze)	76,250	536,037	Burroughs Adding Machine Co., Detroit
Engine Assemblies and parts for 4000 GAA & GAF Eng.	1,500	15,000,000	Ford Motor Co., Dearborn, Mich.
Fork Trucks	125	318,802	Clark Equipment Co., Buchanan, Mich.
	100	385,000	Towmotor Corp., Cleveland
Noise Measuring Sets	115	366,668	Lanagan & Hake Inc., Philadelphia
Trucks (tractor, etc.)	199	982,311	Federal Motor Truck Co., Detroit
Rims, Wheels, Discs & Drums	62,000	1,562,160	Motor Wheel Corp., Lansing, Mich.
Hood (hatch assemblies)	5,000	203,100	Standard Products Co., Cleveland
Gudgeons	105,122	400,488	Machine Tool & Die Co., Detroit
Radiators	2,506	433,412	Modine Mfg. Co., La Porte, Ind.
Flanges & Cones	57,482	235,726	Hart Hydraulics Inc., Detroit
Bulkhead Material	15 items	2,112,583	Great Lakes Steel Corp., Ecorse, Mich.
Crawler Crane	1	413,210	Hanson Clutch & Machinery Co., Tiffin, O.
Snow Plows	10	227,880	Oshkosh Motor Truck Inc., Oshkosh, Wis.
	23	557,952	Wm. Bros. Boiler & Mfg. Co., Minneapolis
	6	155,808	Snook Snow Plow Co., St. James, Minn.
	23	558,417	Sicard Industries Inc., Watertown, N. Y.
	35	838,880	Klauer Mfg. Co., Dubuque, Iowa
Trucks (cargo)	218	268,198	Willys-Overland Motors Inc., Toledo, O.
	4,500	12,380,000	Studebaker Corp., South Bend, Ind.
	15,868	33,500,000	Chrysler Corp., Detroit
Trucks, (stake)	10,298	18,515,441	Ford Motor Co., Dearborn, Mich.
	149	286,132	Fargo Motor Corp., Detroit
Trucks (panel)	5,030	5,734,738	Ford Motor Co., Dearborn, Mich.
Busses (integral)		11,554,200	General Motors Corp., Pontiac, Mich.
		5,750,265	ACF-Brill Motors Co., Philadelphia
Plates (clutch drive)	18,595	936,937	Borg-Warner Corp., Detroit
Autos (station wagon)		845,695	General Motors Corp., Chevrolet Div., Detroit
Disks (torsion bar)	50,000	2,561,500	Motor Wheel Corp., Lansing, Mich.
Refrigerators & Units	700	712,356	U. S. Thermo Control Co., Minneapolis
Radiosonde Modulators	40,000	572,400	Johnson Service Co., Milwaukee
Repeater Telephone	428	523,000	Western Electric Co., New York
Telegraph Terminals	966	1,400,000	Federal Telephone & Radio Corp., Clifton, N. J.
	199	200,000	Western Electric Co., New York
Teletype Sets	1,646	1,900,020	Kleinscheidt Lab. Inc., Deerfield, Ill.
Telephone Switchboards	1,452	300,000	Kellogg Switchboard & Supply Co., Chicago
	12,665	2,500,000	Federal Telephone & Radio Corp., Clifton, N. J.
Telephone Terminals	1,103	1,600,000	Western Electric Co., New York
Ringer Sets (TG-24)	3,275	1,200,000	Kellogg Switchboard & Supply Co., Chicago
Electronic Tubes	2,600	1,252,992	Federal Telephone & Radio Corp., Clifton, N. J.
Switches	200,000	518,000	Zaiger Corp., Lynn, Mass.
Air Compressors	3,384	980,514	W. H. Anderson Co. Inc., Detroit
Testers & Starters	3,305	528,502	Joseph Wiedendorp, Chicago
Facsimile Set (experimental)	1 lot	276,603	Hogan Labs. Inc., New York

CHECKLIST ON CONTROLS

GOVERNMENT control orders are digested or listed each week in this "Checklist on Controls." For complete copies of NPA orders, write to U. S. Commerce Department, Division of Printing Services, attention E. E. Vivian, Room 6225, Commerce Bldg., Washington 25. For ESA orders, write J. L. Miller, Economic Stabilization Agency, Room H367, Temporary E Bldg., Washington 25.

Materials Orders

RUBBER—Amendment of Mar. 1, 1951, to NPA Order M-2 increases somewhat the amount of rubber available for civilian consumption, effective Mar. 1, and delays until Mar. 15 the effective date of the rubber industry's recommendations for conserving natural rubber in a wide variety of products. Amendment is effective Mar. 1, 1951.

ALUMINUM—Amendment 2 to NPA Order M-5 increases by 5 percentage points on Apr. 1 the supplies of aluminum available to independent, nonintegrated primary aluminum fabricators for filling DO rated orders. Producers of primary pig and ingot have been required to accept rated orders from independent primary fabricators up to 6.5 per cent of their scheduled production each month. Effective Apr. 1 the percentage rises to 11.5.

ALUMINUM—Amendment 4 to NPA Order M-7 permits fabricators of aluminum to use 65 per cent as much aluminum in the second quarter of 1951 as they used in the first half of 1950. This is the same as the rate in effect for March. Current restrictions on use of aluminum in less essential items and for nonfunctional purposes will be continued.

COPPER—Amendment 3 to NPA Order M-12 allows fabricators of copper to use 75 per cent as much copper in the second quarter of 1951 as they used in the first half of 1950. Rate for March is 80 per cent. Producers of brass and copper wire mill products and producers of foundry products will continue at their current rates of 80 and 100 per cent of their usage in the first half of 1950. Users of less than 1000 pounds of copper in the second quarter of 1951 are exempted from the order. Current restrictions on use of copper in less essential items and for nonfunctional purposes will be continued.

INSECT WIRE SCREEN—M-42 provides that producers of insect wire screening need not accept DO rated orders for shipment in any one month in excess of 10 per cent of their schedule of production of the product that month, and that they need not accept DO rated orders received less than 15 days before the first day of the month in which shipment is required. NPA Order M-42, effective Mar. 2, 1951.

CONSTRUCTION MACHINERY — M-43 stipulates that in accepting DO rated orders producers of construction machinery and equipment do not have to take more per month than 50 per cent of the average monthly shipments during the six-month period ended June 30, 1950, unless NPA directs them to do so. The order also permits a 45-day lead time for delivery on rated orders. NPA Order M-43, effective Mar. 2, 1951.

POWER EQUIPMENT—M-44 requires manufacturers of heavy power equipment to file monthly reports, beginning not later than Mar. 15, 1951, showing orders on hand for such equipment and the related production and delivery schedules, and on and after Mar. 16, 1951, to maintain, modify or alter production and delivery schedules as the NPA may direct. The order also provides that NPA may assist such manufacturers by allocating steel, copper and aluminum as required to maintain production.

IRON AND STEEL—M-47 prohibits manufacturers of furniture and fixtures, household appliances, jewelry, games, novelties and other personal items, transportation equipment, utensils and cutlery, and certain miscellaneous items to use not more than 80 per cent as much iron and steel in making these products during the second quarter of 1951 as they used in the average quarter of the first six months of 1950. (For a list of products affected see page 166). No limitation is placed on use of steel for manufacture of replacement parts. Those who assemble consumer durables containing steel parts but do not make any of the parts are prohibited from assembling more than 40 per cent as many such items in the second quarter as they assembled in the first half of 1950. Manufacturers of consumer durables who used conversion steel during the first half of 1950 will be required to continue using it at the same proportionate rate to their use of regular mill steel. Manufacturers and assemblers of consumer durables who used not more than 100 tons of iron or steel per quarter in the base period will be permitted to use an equal amount in the second quarter this year. If a producer of consumer durables has changed or changes after July 1, 1950, from the manufacture to the purchase of any part which he made from steel during the first half of 1950 he must deduct from his total permitted use of steel in the second quarter an amount equal to 80 per cent of the material he used in the manufacture of the part during the first half of 1950.

Metallurgical Board To Pinpoint Activities

THE new Metallurgical Advisory Board (STEEL, Mar. 5, p. 54) will concentrate on the critical problems of wartime metallurgy and will operate on a special project basis. Dr. Zay Jeffries, retired General Electric vice president, will head activities on critical and strategic metals and their substitutes. William Mahin, director of research, Armour Research Foundation, will direct the metallurgical projects division.

Chairman of the advisory board is Dr. Robert F. Mehl, head of the department of metallurgy, Carnegie Institute of Technology.

DR. ZAY JEFFRIES

WILLIAM MAHIN

DR. ROBERT F. MEHL

Cole Directs NPA Division

New director of National Production Authority's Iron & Steel Division in Washington is Melvin W. Cole of Bethlehem Steel Co., succeeding David B. Carson of Sharon Steel Co. The appointment is in line with rotational policy under which industry men are asked to take turns in directing certain NPA divisions.

Munitions Board Reorganized

John D. Small, Munitions Board Chairman, appointed Cornelius W. Middleton, Babcock & Wilcox Co., New York, as vice chairman for production and requirements.

Harry K. Clark, president of the Carborundum Co., Niagara Falls, N. Y., now is executive vice president of the Munitions Board.

William Van Atten becomes vice chairman for the international program.

Windows of Washington

By E. C. KREUTZBERG Washington Editor

Those brickbats being heaved at the heads of Mobilizer Wilson and President Truman seem to have covered up the struggle that is going on in labor's ranks

THAT OLD DODGE of starting a fight in one place to get attention away from things going on elsewhere seems to be working effectively in the labor-defense struggle: The internecine warfare among labor leaders is obscured by the clangor labor is raising about not having the say-so it wants in the defense effort.

Labor leaders' insistence that one of their number be given top responsibility alongside Mr. Wilson in the defense mobilization program can be taken with several grains of salt. They are willing to accept such a post only if it does not interfere with their union status. Since lusty young men are breathing down the necks of the oldsters, eager to supplant them permanently as union leaders, appointment to a top government post might mean the end of a labor career.

Current tension among labor leaders was not eased by the administration's action of Mar. 1 approving extension of cost-of-living escalator clauses only if the contracts containing them were in effect Jan. 25. That singled out Walter Reuther as the sole beneficiary under this ruling. Labor leaders were not particularly disturbed by Detroit reports that Walter Reuther was slated to succeed Senator Vandenberg in due time; such a development merely would have removed Mr. Reuther as a competitor in the field of labor leadership. But the administration action, tantamount to hailing Mr. Reuther as the red-haired pet of the administration, has caused dismay.

An Address for Your Book . . .

A new address for your Washington defense agency book is the old GAO (General Accounting Office) building at Fifth and F streets N. W. Gen. W. H. Harrison and his Defense Production Administration staff moved there from the Commerce Bldg. Chances are the whole National Production Authority eventually will be moved to the GAO building because NPA is outgrowing its present quarters in the Commerce, Temporary T and 801 E street buildings. NPA has 1500 people, is taking on about 500 more a week and plans to have something like 5000 when the Controlled Materials Plan becomes effective July 1. The 5000 figure does not include field employees; NPA now has some 500 people scattered about in Commerce field offices in the country; Commerce is expected to increase field office personnel to about 2000 by July 1.

'Down to Earth Testimony' . . .

An ambitious program has been arranged for his House Small Business Committee by Chairman Wright Patman. Three subcommittees are to hold hearings away from Washington "to obtain down-to-earth testimony from small businessmen in every section of the nation regarding the pressing problems now confronting them." Special attention will be given to the question of whether small business gets adequate consideration from the armed services under negotiated procurement.

The Fine Points of Selling . . .

Are you up on all the fine points of selling to the government? If not, it should pay you to attend a three-day course in Washington christened the "Institute on Armed Services Procurement." It is to begin Mar. 19 so notices of enrollment should be given at once to Dr. Paul F. Douglas, president, American University, 1901 F St. N. W., or E. K. Gubin, 740 11th St. N. W., Washington. The latter will conduct the institute. Dr. Douglas can be reached by phone at STerling 4940 and Mr. Gubin at REpublic 2431.

The co-operating sponsors are the Munitions Board and the National Association of Manufacturers.

Scraping for Scrap?

Don't forget, when you are running out of iron and steel scrap, that the man in a position to help you is Marvin S. Plant, chief, Scrap Section, Iron & Steel Division, National Production Authority, Washington. Mr. Plant is allocating a certain amount of scrap every day, on the basis of directives to industrial producers and the railroads as to how much of their scrap they should ship to consumers faced with shortages. Allocations directives to the dealers should begin to go out shortly after Mar. 15, by which date dealers are to report on their scrap inventories, commitments, etc.

NEA

TEMPO FOR TEMPORARY E: This is Tempo E, headquarters of the Economic Stabilization Agency. Anyone who has a gripe with the government on wages or prices may end up at Temporary E where a houseful of government employees interview and keep records for the stabilization program. All is not stability within Tempo E, though; crews of carpenters and painters are adding to the general din by repairing and remodeling the quarters. Shabby and dim in comparison with its surrounding neighbors, Tempo E was supposed to be torn down after the war—World War I, that is

Brush Up—
MANPOWER TRAINING, RECRUITING TECHNIQUES

By AUSTIN M. FISHER
Chairman, Fisher & Rudge Inc., New York

AFTER a five-year respite, American industry once more finds itself facing a period of critical manpower scarcities. Just as in the labor-scrambling days of 1942 to 1945, the metalworking industries and other key segments of the economy are again discovering that "Help Wanted" ads in newspapers are far from a solution to fast looming worker shortage problems.

The Pinch Hurts—The scarcities are already beginning to pinch. Stepped-up draft calls are now draining away some 80,000 men a month. By early spring this monthly manpower toll will have leaped to 100,000 and the rush will be on.

Just around the corner, too, are further curbs: Federal limitations on the number of new employees (to prevent any recurrence of labor "hoarding"), restrictions on "indiscriminate" separations and patriotic pressure on workers in nonessential fields to move into more vital occupations.

Semi-skilled jobs which will be affected in the typical metalworking plant include milling machine operators, turret lathe operators, mold stampers, tapping and pointing machine operators, and die makers' helpers. Among skilled craftsmen who may have to be replaced are tool and die makers, machinists, profiling machine operators, and boring, centering, profiling, and keyseating set-up and operate men.

Forearmed—Before any effective solution can be found for this impending replacement headache, steps must be taken to determine the scope of the problem. This means a thorough analysis of the age, draft status and job classifications of all male workers. The detailed compilation of manning tables, comparable to those advocated by the War Manpower Commission during the war, will reveal which job categories present the greatest problem.

The next step involves the preparation of a practical blueprint for the recruitment of replacements as fast as they are needed, followed by a program designed to advance draft-exempt semiskilled employees into jobs vacated by skilled war-bound workers. Finally, and equally important, an overall manpower utilization program is a "must," in order to make the most efficient use of available personnel.

A four-point program is indicated: 1. A determination of potential manpower holes; 2. a program of training and up-grading; 3. a replacement recruiting program; 4. a production maintenance program, to keep output at a peak with the same, or less, personnel.

What the Job Involves—All four points are predicated upon a thorough-going program of job analysis, breaking down every operation to determine precisely the amount of education, intelligence, dexterity, strength and training required for adequate performance. Would a good screw machine or turret lathe operator make a satisfactory replacement for an engine lathe operator? How long would it take to train a tool and die maker's helper for the job of die maker? Is it possible to transform a milling machine operator into a first-grade keyseating set-up and operate man, and still maintain prescribed production and safety requirements?

To insure the best results, a replacement program of this type should be geared as much as possible about a *promoting-from-within* theme, with inducements based upon increased wages and/or better working conditions.

S.O.S.—Where outside instruction is necessary to train for skilled jobs, machinery manufacturers may be called upon, and will often be found willing to institute supplementary training courses. Local night-school and YMCA courses may also be resorted to. Trade associations, Chambers of Commerce, or your local manufacturers' associations may also be induced to inaugurate training programs.

Training courses for the various semiskilled metalworking jobs present much less of a problem. The supervisory staff is the key to success here, and your foremen and their assistants should devote a definite amount of time each day to breaking in new recruits.

Utility Infielder—The "understudy" method can also be used to advantage in inducting the semi-skilled worker. Before a vacancy occurs, for instance, put a new worker on the job for a few hours a day as an apprentice operator.

It is always important, no matter what the training process, to clarify the specific reasons for an operation to the newcomer, along with an explanation as to why it must be performed in a particular way. Remember that this same worker may himself need replacing tomorrow. If he's unable to explain the details of his job to his substitute, the training process may be slowed accordingly.

Background Information—It is also advisable to delve into the hobbies and sideline pursuits and interests of your new employees. Often the proficiency acquired from an avocation can be tapped to fill a valuable niche in the plant.

While in-plant training of the unskilled or the semiskilled worker constitutes a key part of metalworking industries' manpower replacement program, the recruitment of new workers to plug the holes left by promoted employees poses an even more difficult problem. The metalworking industries, like all others, must look to sources such as these:

Workers over forty. This group proved itself invaluable during the war, when its members racked up impressive production records while maintaining extremely low accident and absentee rates. It may be advis-

Many Pools Untouched

able, to offer special inducements again to the oldsters: Shorter hours, more frequent or longer rest periods, transportation, etc.

The handicapped. This group also did sterling duty during the war, in many cases outperforming non-handicapped workers in production and reduced accident and absentee rates.

Women. Prospective distaff workers will prove your most prolific source of employment, particularly those from 25 to 55. While many of this group are mothers, in which case they are potential part-time employees, many others are married but childless and will welcome the opportunity to return to full-time work.

Students. This should be one of your best sources of part-time workers. It is a good idea to discuss your employment situation with local high school principals, detailing the jobs which will need to be filled and planning a satisfactory working schedule.

Refugee workers. Displaced people are already proving themselves in metalworking and various other industries. Most communities of any substantial size have organizations whose primary concern is the problems of the displaced, and may be depended upon for advice and help regarding their availability for employment.

Other minority groups. Manpower scarcities always produce large numbers of capable job aspirants among minority groups, whose employment prospects in some job categories are limited in normal times. Negro workers demonstrated an ability to perform a wide variety of highly skilled operations during the war. They are a potential solution to many of your manpower woes now, provided you put in your bid before other industries beat you to it.

No recruiting program, no matter how well planned, will be very successful if it does not include effective procedures to induce prospective employees to apply for work. All conceivable avenues must be investigated, from the usual "Help Wanted" ads to feature newspaper stories about the plant, its advantages and job opportunities; from spot radio announcements at appropriate hours to word-of-mouth advertising.

Pass the Word Around—Spread the news of forthcoming job opportunities now—in fraternal and sorority organizations, clubs and churches. Your present employees are one of the best means of communication. During the war, many companies offered prize and money inducements as bonuses for those who recruited the most workers.

Another excellent technique is to spread the word through local business establishments—gasoline stations, lunch-wagons, and various other places whose trade depends upon volume traffic.

Kernel of the Problem—No matter how well your recruitment and training procedures work, it will still be necessary to make more effective manpower utilization a major element in the program. Revive the various techniques you followed during the war. It will be necessary to use every practical method you can develop to increase production with less personnel, to make conditions attractive enough to hold turnover to a minimum, to keep morale high, to maintain constant watch over the conditions making for safety and to keep a tight rein on absenteeism.

Finally, go all-out in an attempt to keep your manpower in as good condition as your machines, to treat your employees as you would like to be treated yourself, and your problem is half solved.

REPRESENTS GERMANS: Leaving the office of John J. McCloy, U. S. high commissioner for Germany, is former U. S. Secretary of War Robert P. Patterson, after pleading for German Ruhr industrialists. Patterson represents German stockholders opposed to the allied plan to break up old steel and coal firms

U. K. Groups Go to War

British managerial development, the company group, gives flexibility for fast conversion

BRITISH industry is mobilizing for defense and hopes to make good use of a flexibility found in one management technique used in only isolated instances in the U. S.—the pool or group of industrial companies.

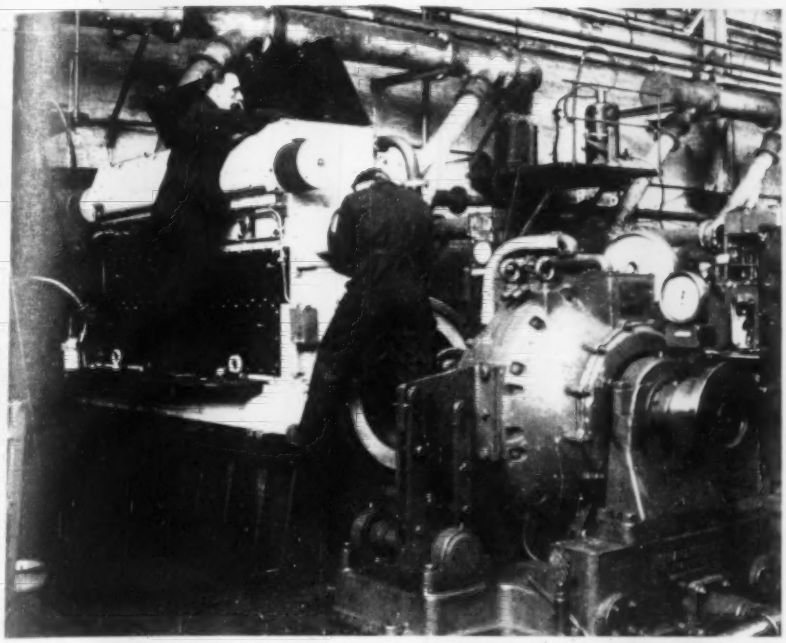
Discovery — The advantages of grouping a number of firms making similar or related products so that output may be rationalized with greater efficiency and economy of time and production costs have been studied by several British metalworking segments. One of the important ones firmly established is called the Brush ABOE group. As a group, it claims to be the largest producer of diesel engines in the world. Its capacity represents about 35 per cent of the total diesel production capacity of the United Kingdom.

It consists of 14 firms in the U. K. plus companies it has established in the U. S., Canada, South America, South Africa, India, the Far East, Australasia and Belgium which handle some of the U. K. companies' foreign business. Its exports in 1950 exceeded $42 million. This represents about one-third of all U. K. diesel engine shipments abroad.

For Export—The group was formed primarily to provide the export market with a full range of engines from the smallest to the largest. The group also seeks to confine the activities of any individual factory in the group to a limited range of products, thus reaping the advantages of the most specialized machinery and line production. The group companies all use the 130 main agents, plus subagents and distributors all over the world. Sir Ronald Matthews is group chairman.

One of the major firms in the group is Brush Electrical Engineering Co. Ltd., Loughborough near Manchester. The company started because of inventions of Charles F. Brush in Cleveland, O., and development of the electric arc lamp. By 1889, the company was branching into other electrical lines, and eventually it concentrated on diesel engines. Today much of its output is for power generation.

Oil Engines—Another major company associated with the group is Henry Meadows Ltd., with a plant at Wolverhampton. Meadows started making gasoline engines for cars in 1921. Today it manufactures gasoline and diesel units ranging from 28 to 275 horsepower for heavy trucks, die-



JUST CHECKING: A 'J' 6-cylinder diesel engine of 420 brake horsepower at 750 revolutions per minute naturally aspirated, is being tested by workmen at Mirrlees, Bickerton & Day Ltd., Stockport, England

sel locomotives, ships, bulldozers, tractors and cranes.

While the Meadows range of diesels goes up to 275 horsepower, larger diesels are made at the Stockport works of Mirrlees, Bickerton & Day Ltd., another Brush ABOE group company. That firm was the builder of the British Empire's first diesel engine and the third in the world, in 1897, at its Glasgow factory. The company eventually concentrated entirely on diesels and now has a 5½-acre plant at Stockport. It makes units from 135 to 2880 horsepower for industrial, marine and trail traction purposes. It's heavily involved in the naval marine business.

Italian ECA Costs Up

Italian equipment manufacturers using Marshall Plan credits complain that the conditions under which those credits are granted will slow their industrial mobilization.

The credits are granted to the individual Italian manufacturers by a state organization, Istuto Mobiliare Italiano. Those loans must be repaid within 15 years with an interest of 5½ per cent. Manufacturers in Britain, Austria and France have to pay an interest rate of only 3 per cent. By paying the interest rate of 5½ per cent over 15 years, the Italian user of the credit needs an additional capital layout of 37½ per cent.

What's more, Italian Customs collects a duty of nearly 12 per cent on some Marshall Plan equipment going into the country. Most of the material imported under the Marshall Plan is not being manufactured in Italy.

The Italian equipment buyer must also pay another 7½ per cent of the installation cost on ocean freight, insurance, loading and unloading. Besides that cost, Italian manufacturers are practically forced to order their electrical equipment from Italian sources. Such equipment is at least 5 per cent more expensive than equipment procured from American or other European suppliers of electrical installations. Construction of buildings and auxiliaries is expensive in Italy and will cost the equipment buyer 10 per cent more than in the U. S.

Those additional costs total 72 per cent, so the Italian industrialist who decides to use Marshall Plan credits must calculate 72 per cent more than the initial cost of the installation. Some 50 per cent of that 72 per cent results from Italian duties and charges for handling Marshall Plan funds which are put at the disposal of the Italian government free.

GE Builds Equipment for Italy

A $2 million order for steel mill electrical equipment has been placed with International General Electric Co. Inc. by Societe Italiana Accierie Cornigliano in Genoa, Italy.

Company engineers say that is the largest single order for GE steel mill equipment ever received from Italy. Electrical equipment to be furnished for the four cold mills will provide a total connected main drive of nearly 20,000 horsepower.

Electric equipment to be built in the U. S. by GE includes main drive motors, generators, complete ac and dc control, switchgear, ac and dc auxiliaries and filters for recirculating ventilating equipment. Compagnia Generale di Elettricita in Italy will provide the large synchronous driving motors for the main motor-generator sets, the recirculating downdraft ventilating equipment except for filters and the installation drawings.

Soviet Resources Large

Reds have easy access to all minerals important to an industrial economy

WITHIN her own boundaries or within easy access of her borders, Russia has all the mineral resources required for an industrial economy, says Thomas S. Lovering, economic geologist for the U. S. Geological Survey.

Coal—He says coal production has been doubling every five years and will equal that of the United States by 1960 unless war intervenes.

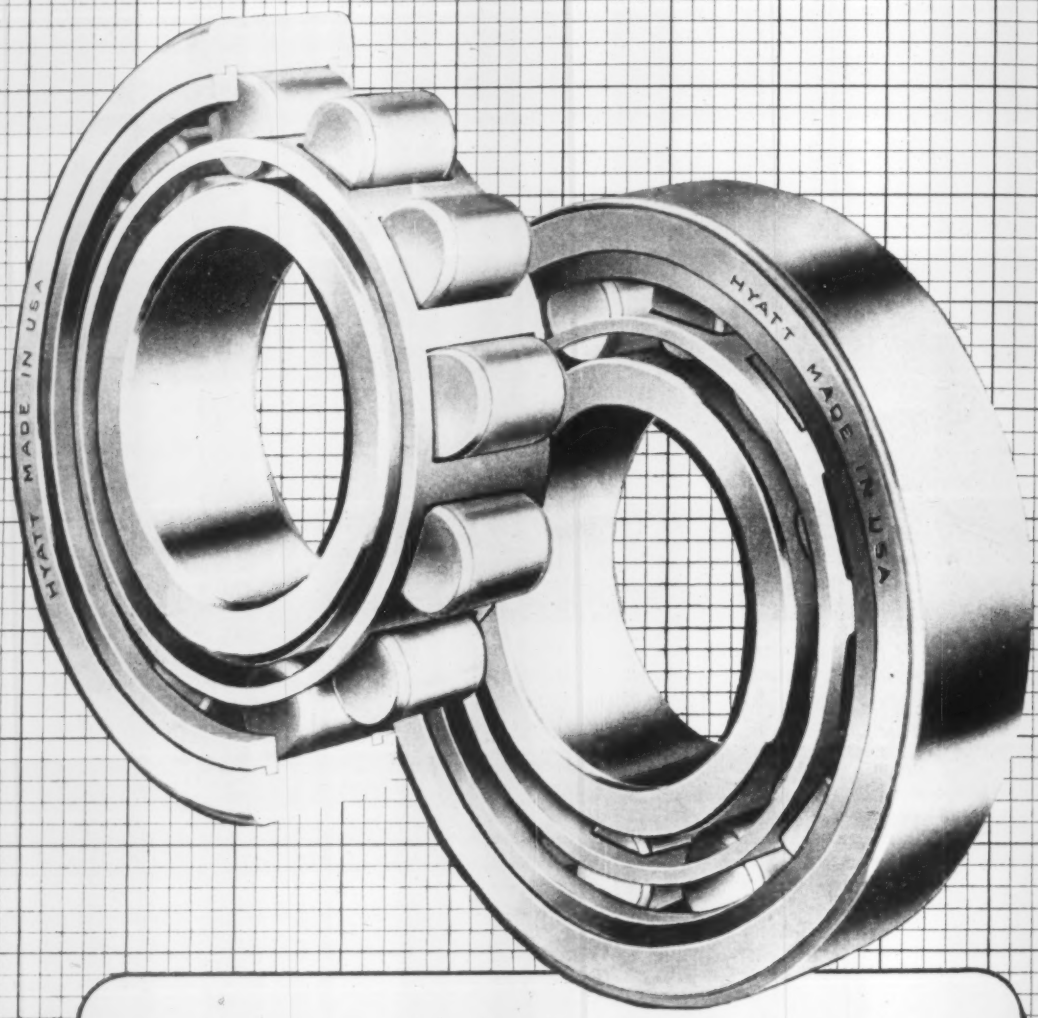
Iron and Steel—During the past several years, the iron and steel industry has been expanding at the rate of 2 or 3 million tons a year. Russia is now producing more than 20 million tons of pig iron yearly. The U. S. turns out 50 million tons annually.

Copper—Present supplies are adequate, says Mr. Lovering, but they'll have to be supplemented by new discoveries or substantial imports during the next decade if her industrial expansion continues.

Aluminum Ore—Although her output of aluminum has expanded greatly, Russia has been forced to use relatively poor ores because she is poorly supplied with that raw material.

Well-Heeled—The geologist says Russia is well supplied with some of the metals in which the U. S. is deficient, particularly nickel, platinum, chromium and manganese. The Soviet has little tungsten and tin, but both metals are available in quantity from China. Russia's petroleum supplies are adequate.

Uranium—Little is known about the Soviet's uranium deposits, says Mr. Lovering, but there's no evidence of any high grade deposits within her borders. A large part of the pitchblende now used has come from Czechoslovakia. Like other oil-rich countries, she does have large reserves of low-grade black shale containing uranium oxide.



HYATTS...to your advantage

Take a good look at what the "specs" say about bearings when you are planning to buy new machines or equipment.

If Hyatt Roller Bearings are built in, then you won't have to give them another thought.

Leading manufacturers of machines and equipment you need in your business build in Hyatts *first* to *serve* and *last*.

It's to your advantage to buy Hyatt-equipped machines for longer equipment life and less maintenance and lubrication time. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

HYATT ROLLER BEARINGS

By C. C. TUTTLE *Detroit Editor*

Mirrors of Motordom

The auto industry makes news with record production, earnings and big new defense contracts. GM's 1950 earnings highest for any company anytime, anywhere

DETROIT

FRONT-PAGE news was made at every turn by the automotive industry last week.

There was the General Motors annual report—a revelation startling enough to make the most blase financier catch his breath. There were Ford and Packard's big defense orders. There was General Motors' announcement of the magnitude of the defense effort already assigned to it. There was additionally the government decision to permit higher car prices and to recognize the escalator terms of the industry's labor contracts. There were strong signs that the economy is capable of supporting both guns and butter and that industry is anxious to give both, and make them available in undreamed-of quantities.

Records Fall at General Motors

More money was earned by GM in 1950 than has ever before been recorded for any private enterprise. Its net profit exceeded that of the country's railroads handily. Its sales were above $7.5 billion. The company produced almost four million cars and trucks. Its payrolls and taxes were also at the highest in history.

With sidelong glance at the labor leaders who will undoubtedly find in this report much high-velocity ammunition, C. E. Wilson and Alfred P. Sloan Jr., president and chairman, respectively, point out that GM's record totals should not be too surprising. National income, industrial production and employment were at peacetime highs. Demand for all types of products was recordbreaking. GM, as the most significant private structure in the country's industrial framework, they imply, could be expected to set the pace.

Sales Soar—GM's net sales of $7,531,086,846 resulted in net profit of $834,044,039. This was 11.1 per cent of sales, an earning per share of common of $9.35. Equivalent earnings in 1949 were $7.32. Sales and profit, dollarwise, far exceed those of 1949, which shattered all records. That year's sales of $5.7 billion and profit of $656 million are completely dwarfed. Net income as a percentage of sales, however, is slightly lower, the result of the higher take by taxes. It was 11.5 per cent of sales in 1949 and 12.6 per cent in the prewar 1936-1940 period.

"In appraising the financial results of 1950 operations," Messrs. Wilson and Sloan caution, "it is well to bear in mind that GM's 1950 profits were earned in a year of exceptionally high volume." They point out that in high volume years profits rise more sharply than sales, and in low volume years fall more sharply. Such fluctuation results from the important portion of costs which are fixed. "If profits were not to fluctuate," they remind those with an aversion to bigness, "prices would have to be increased in periods of low volume but would fall in periods of high volume. Such a policy would not be desirable nor would it be practical in an industry like the automotive industry in which any approach to pricing is subject to the impact of both costs and competition."

Taxes Surpass Earnings—The tax load carried by the corporation was in excess of its earnings. Taxes on income totalled $977.6 million, including $155.2 million for excess profits. Provision for state and local taxes and for social security amounted to $141 million, bringing total tax load on GM to $1119 million. Sales and excise taxes on its products amounted to an additional $416 million.

Of each dollar of products sold, 46¾ cents went to suppliers for materials, services, etc. Employees received the next largest amount at 25¾ cents. To federal, state and local governments went 15 cents. GM stockholders, who number a record 445,000, receive 7 cents on the sales dollar, and 4 cents of the earned dollar is retained in the corporation. Providing for depreciation and obsolescence of plants and equipment takes the remaining 1½ cents per dollar.

Plenty of Materials—The materials the company needed in its products were more abundantly available in 1950 than in any previous postwar year, the report stated. This coupled with greater utilization of expanded facilities and high productivity of employees made possible the outpouring of 3,653,358 vehicles from GM plants in the U. S. This compares with 2,672,894 in 1949. Canadian GM plants produced an additional 158,805 units and overseas GM operations accounted for 180,135 units. The total, 3,992,298 cars and trucks, compares with 2,896,384 in 1949. Of the U. S. production 3,046,593 were passenger cars and 606,765 were trucks and coaches.

Of total U. S. production of cars last year, GM's share of the market was 45.7 per cent. Its truck slice was only slightly less at 45.4 per cent.

Auto, Truck Output

U. S. and Canada

	1951	1950
January	645,688	609,878
February	624,300*	505,593
March		610,680
April		585,705
May		732,161
June		897,853
July		746,801
August		842,335
September		760,847
October		796,010
November		633,874
December		671,622

Weekly Estimates

Week Ended	1951	1950
Feb. 10	116,020	125,737
Feb. 17	177,932	123,712
Feb. 24	199,247	125,285
Mar. 3	181,109	124,072
Mar. 10	175,000	124,563

Estimates by Ward's Automotive Reports

* Preliminary.

Chrysler Strike Recovery Sharp

Chrysler's report was small potatoes alongside the GM statement, but nevertheless showed the surprising elasticity of the corporation and of the overall automobile market last year.

Despite the 100-day strike throughout the spring months, Chrysler was able to set a record for unit and dollar sales at 1,313,239 vehicles and $2,190,693,425. In 1949 the corporation produced 1,267,470 vehicles for a sales volume of $2,084,602,547. Net earnings last year, however, were

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down as the result of the strike. They totalled $127,876,791, or $14.69 a share, as compared with $131,170,096 and $15.19 a share in 1949. Earnings were 5.84 per cent of sales in 1950 against 6.34 in 1949.

GM Defense Business Grows

How significantly the automotive industry is being called on by the military can be better assessed as each week progresses. The most comprehensive statement by an individual company on its defense role makes up a part of GM's annual report. The corporation has already received military orders amounting to more than $3 billion. This does not represent the total volume expected, many orders being placed for initial quantities which have little bearing on the ultimate needs. It furthermore does not include the amount being spent by GM for facilities.

With 55 per cent of the defense items on order with GM falling into the strictly military category and comprising items unrelated to GM's normal peacetime products, volume production is not expected until after 1951. The $3 billion figure, therefore, has little bearing on GM's expected military production for this year. Most of the projects required for this portion of the total defense load will go through a tool-up and make-ready stage, which can be expected to take longer than would the corresponding preparations for production of civilian items. By 1952 the effort will roll in earnest. Included in this group are tanks, planes, guns, projectiles and Sapphire jet engines.

The remaining 45 per cent of the defense orders are in two classes: Military items which GM was making for the services before the Korean war, such as aircraft propellers, bombsights and navigational instruments, diesel and Allison jet engines; and items similar to those made for civilian use, such as trucks, administrative vehicles, bearings and electrical equipment. Of the two types the first accounts for 35 per cent of the defense orders on the company's books, the second accounts for 10 per cent. The latter class of orders will in most cases be filled this year.

Ford's War Jobs Near $1 Billion

Giving GM a good run for the money, defense contract-wise, is Ford. Its commitments from the services now are approaching $1 billion. Latest is a letter order for medium tanks, to be built at a yet-to-be-constructed plant in the Detroit area. This order has an estimated value of $195 million. An estimated 8000 employees will be needed to man the new plant, which will be part of the aircraft engine, tractor and machined products group, and will be under the supervision of David W. Lee, manager of the tractor and industrial engine division.

The tank commitment is the fifth signed by Ford since August. Pratt & Whitney engine manufacture at Chicago, military trucks and busses at Ford Highland Park plants, tank engines and parts at the Rouge, and ammunition parts at Highland Park comprise the present list.

Packard Builds Turbojets

Packard which last month obtained initial Navy contracts for diesel engines in the amount of $20 million has been picked to build turbojet engines for the Air Force. Exactly how much money is involved is not disclosed, but Packard president Hugh J. Ferry calls it "one of Detroit's biggest known orders to date."

The engine will be produced under a licensing agreement with General Electric, augmenting that company's output from plants at Lynn, Mass., and Lockland, O. The J-47, rated at 5200 lb of thrust, powers the F-86 Sabre fighter, the Boeing B-47 bomber, the B-45 four-jet tactical bomber, Martin XB-51 three-jet tactical bomber, the Republic XF-91 experimental Interceptor. Four J-47 engines are also used in conjunction with six reciprocating engines on the Convair B-36 long-range bomber.

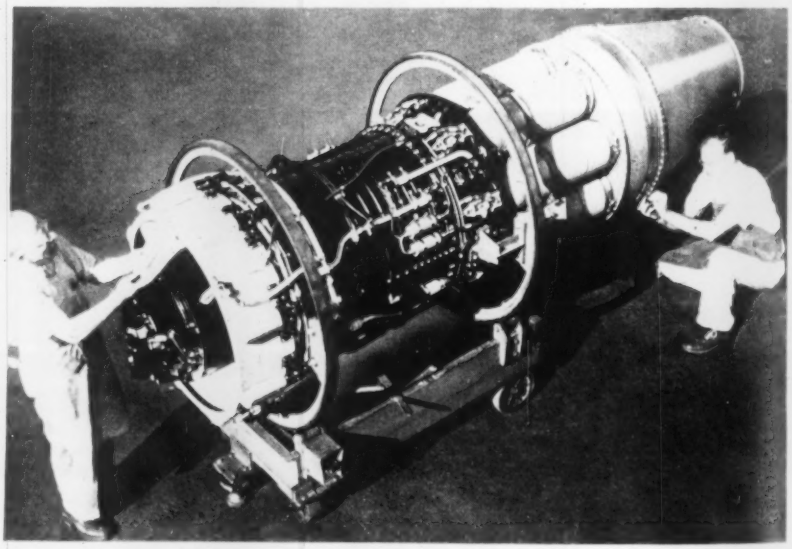
A three-fold expansion in Packard employment may eventually be required, Mr. Ferry states. The engine will be built in the company Detroit-area plants, with more manufacturing space being added as needed. A tool-up period of 14 months will be required but in two years peak production of the engine is anticipated. Packard has been conducting familiarization studies on the engine for about four months. GE's aircraft gas turbine divisions will supply engineering and manufacturing assistance.

K-F Makes Planes, Cars

The build-em-in-the-plants-we've-got philosophy is shared by Kaiser-Frazer Corp. which has set up a preliminary plan for building C-119 packets in the manufacturing facilities at Willow Run. This scheme would allow automobile production at the current rate (about 800 daily) but will mean two-shift operations.

The change-over to accommodate both plane and car output is planned to be accomplished with little disruption. The car assembly lines would be consolidated into space now occupied by body stamping, body-in-white, chassis, final assembly and part of the paint and trim departments at Willow Run.

Side-by-side defense-civilian work is also envisioned at K-F's Detroit engine division plant on Jefferson avenue. A portion of this plant will be used for manufacture of Wright R-1300 engines for the Air Force while auto engine production lines are also in operation.



ON ORDER: One of Detroit's biggest defense orders to date has been given to Packard Motor Car Co. They will build this General Electric J-47 turbojet engine which powers Air Force fighters and bombers. Production will be entirely in Packard's Detroit area plants

The Business Trend

Industrial production index turns down slightly after setting postwar record. Decline is due to drop in auto output, which in preceding week contributed largely to the new record

AFTER a one-week stand at a new postwar peak, STEEL's industrial production index turned down moderately in the week ended Mar. 3 and registered 221 per cent of the 1936-1939 average.

The postwar peak in the preceding week turned out to be more impressive than early figures indicated it would be. Final tallies from the auto industry were substantially higher than preliminary ones, and as a result the new postwar peak in STEEL's industrial production index in the week ended Feb. 24 was 225 per cent. Previous postwar high was 222 per cent recorded last October. To register 225 per cent, the index jumped 6 points over the preceding week. A year ago the index registered only 163.

Auto Output Off Slightly . . .

The auto industry, whose spectacular performance in the week ended Feb. 24 was the greatest factor in kicking the industrial production index to a new postwar peak, was responsible almost solely for the decline in the week ended Mar. 3.

Revised figures from *Ward's Automotive Reports* shows passenger auto and truck output in the week ended Feb. 24 was 199,267. That is the greatest number since the 205,334 units assembled in the week ended last June 24. The 199,267 units consisted of 163,438 passenger cars and 35,829 trucks.

From the 199,267-unit level the output dropped to a preliminary 180,584 in the week ended Mar. 3. There was belief that final reports from the auto industry will push this up a bit. Inability to get enough parts and labor involvements were blamed for the decline.

On a yearly basis the production average for the first nine weeks of this year would yield 8,060,000 passenger cars and trucks. Last year the industry built 8,404,067. Looming ahead, however, are government restrictions that are expected to put a brake on the auto production rate.

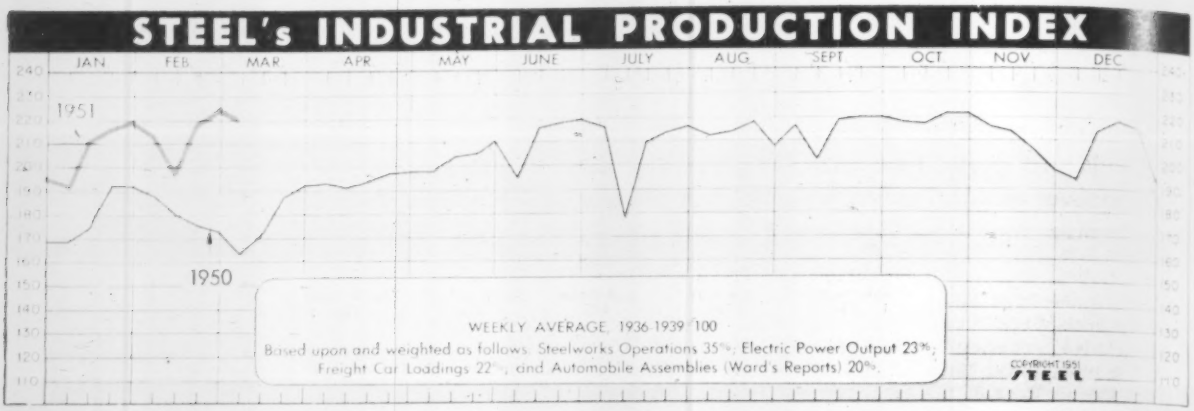
Pouring More Steel . . .

Also contributing mightily to the high level of industrial production is output of steel for ingots and castings. In the week ended Mar. 3 the steel industry was expected to surpass the 2-million-ton mark for the third time in history. The previous two times were earlier this year. Production of steel for ingots and castings in the week ended Mar. 3 was expected to be 2,019,000 net tons. This was necessitating operations at slightly above theoretical capacity. In the week ended Feb. 24, output was 1,985,000 tons.

A Lot of Power . . .

Another heavy contributor to the high rate of industrial activity is the electric power industry. Making use of its increased productive capacity, that industry is turning out power in a volume approximately 16 per cent above that of this time last year. Thus far in 1951 the lowest weekly distribution of electricity is larger than the highest weekly out-

BAROMETERS of BUSINESS	LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY				
Steel Ingot Output (per cent of capacity)†	100.0	99.5	101.5	69.0
Electric Power Distributed (million kilowatt hours)	6,822	6,833	7,099	5,879
Bituminous Coal Production (daily av.—1000 tons)	1,677	1,822	1,902	437
Petroleum Production (daily av.—1000 bbl)	6,016	5,945	5,938	4,909
Construction Volume (ENR—Unit $1,000,000)	$352.1	$223.8	$235.1	$133.4
Automobile and Truck Output (Ward's—number units)	180,584	199,267	151,206	124,072
*Dates on request, †Weekly capacities, net tons: 1951, 1,999,035; 1st half 1950, 1,906,268; 2nd half 1950, 1,928,721.				
TRADE				
Freight Car Loadings (unit—1000 cars)	745†	735	651	574
Business Failures (Dun & Bradstreet, number)	170	127	159	179
Currency in Circulation (in millions of dollars)‡	$27,188	$27,164	$27,045	$27,060
Department Store Sales (changes from like wk. a yr. ago.)‡	+24%	+18%	+25%	−5%
†Preliminary. ‡Federal Reserve Board.				
FINANCE				
Bank Clearings (Dun & Bradstreet—millions)	$14,203	$18,057	$16,547	$14,484
Federal Gross Debt (billions)	$256.0	$256.0	$256.1	$256.2
Bond Volume, NYSE (millions)	$22.5	$18.5	$25.9	$19.3
Stocks Sales, NYSE (thousands of shares)	8,773	7,817	14,247	7,932
Loans and Investments (billions)†	$69.2	$69.2	$70.4	$67.0
United States Gov't. Obligations Held (millions)†	$30,900	$30,858	$32,443	$37,162
†Member banks, Federal Reserve System.				
PRICES				
STEEL's Weighted Finished Steel Price Index††	171.92	171.92	171.92	156.13
STEEL's Nonferrous Metal Price Index‡	261.9	262.3	262.2	159.8
All Commodities†	182.9	183.3	180.9	153.0
Metals and Metal Products†	188.7	188.7	188.7	168.5
†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				



Week ended Mar. 3

turn in the corresponding period of 1950. The high rate of activity carried the electric power industry to a new weekly production record only a few weeks ago.

Busier Railroads . . .

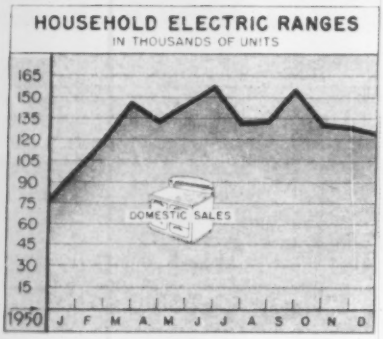
The high rate of industrial activity must of necessity be supported by transportation. Reflecting the response of the railroads to the call from industry are figures on railroad freight car loadings. In each of the weeks thus far in 1951, loadings have exceeded those for the comparable weeks of last year. Result: Loadings thus far this year are 22 per cent ahead of those for the like period of 1950.

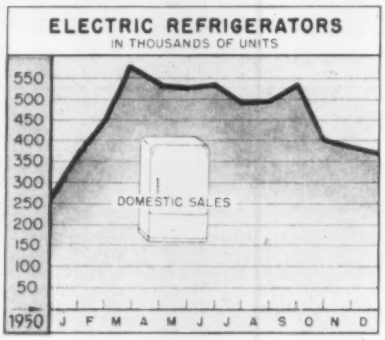
Coal Piles Up . . .

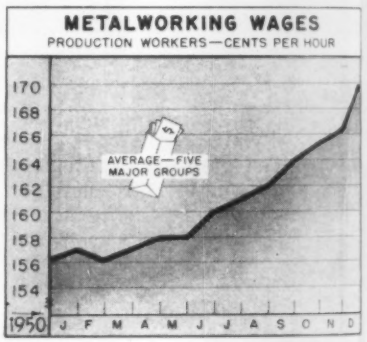
Helping make business good for the railroads is bituminous coal production. This year from Jan. 1 through Feb. 24, coal output was approximately 83,280,000 net tons, compared with only 42,007,000 tons in the corresponding period of last year. In the latest week for which there is a report—Feb. 24—production was estimated at 10,060,000 tons, down slightly from the preceding week's 10,930,000 tons. High production is steadily pushing coal stocks upward. The 73,887,000 tons on hand Feb. 1 were the highest since July 1, 1949, when stocks totaled 74,161,000 tons. On Jan. 1, 1951, stocks amounted to 72,516,000 tons. On Feb. 1, 1950, stocks were 37,119,000 tons. Industrial stocks on Feb. 1, 1951, were good for 62 days' operations.

Construction Booming . . .

Industrial buildings continue to count heavily in the high weekly volume of engineering contracts awarded. In the week ended Mar. 1, indus-







Household Electric Ranges

	1950	1949	1948
Jan.	97,925	106,473	103,585
Feb.	118,989	87,370	103,506
Mar.	145,417	87,543	127,461
Apr.	132,859	59,894	104,677
May	145,498	52,286	98,983
June	158,534	68,107	123,300
July	130,505	62,402	83,485
Aug.	132,243	66,222	116,107
Sept.	156,216	91,073	128,829
Oct.	130,452	72,672	122,516
Nov.	128,363	60,523	123,661
Dec.	124,360	77,011	105,387
Total	1,601,361	903,806	1,341,497

National Electrical Mfrs. Assoc.

Electric Refrigerators

Domestic Sales—Units

	1950	1949	1948
Jan.	364,002	380,853	272,121
Feb.	450,751	337,424	281,580
Mar.	572,691	369,216	338,109
Apr.	531,498	324,370	330,720
May	528,506	330,753	317,763
June	534,489	296,199	373,115
July	490,802	315,444	351,094
Aug.	496,486	307,622	281,345
Sept.	512,125	309,429	344,260
Oct.	399,330	252,580	380,854
Nov.	386,142	221,221	374,470
Dec.	370,286	259,158	330,660

National Electrical Mfrs. Assoc.

Metalworking Hourly Wages
(cents)

Production Workers—Five Major Groups

1949	Prim Mtls.	Fab. Prod.	Mach-inery	Elec. Mchy.	Trans. Equip.
Dec.	159.7	147.3	154.4	144.4	167.9
1950					
Jan.	161.5	148.7	154.7	144.3	168.2
Feb.	160.3	148.1	155.2	144.2	167.7
Mar.	160.4	148.0	156.0	144.3	167.7
Apr.	160.9	148.8	156.9	144.6	170.6
May	161.9	149.6	157.6	145.3	169.8
June	163.0	151.5	158.3	145.1	172.7
July	164.5	152.2	159.5	146.4	172.8
Aug.	163.9	153.9	160.7	146.7	173.5
Sept.	166.9	156.1	162.6	148.5	177.0
Oct.	166.6	157.5	165.4	152.2	178.3
Nov.	168.3	158.5	167.4	153.6	179.1
Dec.	174.3	161.7	169.0	156.2	181.2

U. S. Bureau of Labor Statistics

Charts—Copyright 1951, STEEL

[illegible] building awards accounted for $[illegible] million of the $352.1 million worth of engineering contracts, says *Engineering News-Record*. Total of all engineering contracts awarded in the first nine weeks of 1951 is $2890 million, a 67 per cent gain over the corresponding period of last year.

Rush for Hard Goods Off . . .

Dollar volume of department store sales in the week ended Feb. 24 was 21 per cent over that of the corresponding week of last year, but, retail executives say, the price differential between now and last March accounts for almost all of the dollar volume increase. The rush for hard goods is reported to be easing off.

Business Boom . . .

The buying rush earlier this year, coupled with accelerated defense procurement, brought a business increase to manufacturers in January and spurred them to boost their shipments, says the U. S. Office of Business Economics. New orders placed with manufacturers that month totaled $26.5 billion, 15 per cent larger than in December. Shipments rose 8 per cent over December to $23 billion, about equal to the postwar peak.

Signs of the Times . . .

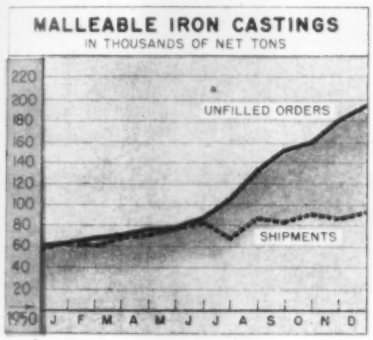
This high rate of business is reflected in the Federal Reserve Board's industrial production index for January. It registered a preliminary 219 per cent of the 1935-1939 average. The December rate was 217.

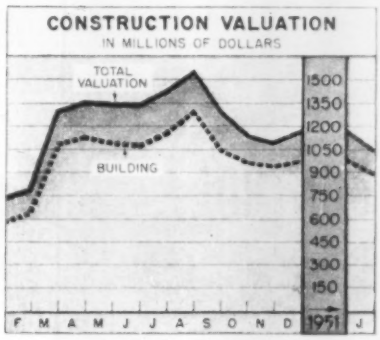
Trends Fore and Aft . . .

After a two-month decline, business failures increased 14 per cent over December to 775 in January . . . Factory sales of household washers totaled 321,092 in January, compared with 377,013 in December; dryers aggregated 31,935 compared with 41,418; and ironers, 24,600, compared with 38,800 . . . Reflecting the big expansion under way in industrial capacity, sales of fuel-fired industrial furnaces zoomed to $4,033,028 in January, almost double that of any recent month.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Durable Goods	Feb.12	Gray Iron Castings	Mar.5	Radio, TV	Feb.26
Employ., Steel	Mar.5	Indus. Production	Feb.12	Ranges, Gas	Mar.5
Fab. Struc. Steel	Feb.12	Ironers	Feb.19	Steel Castings	Feb.26
Foundry Equip.	Mar.5	Machine Tools	Feb.12	Steel Forgings	Feb.26
Freight Cars	Feb.26	Metalwkg. Employ.	Feb.19	Steel Shipments	Mar.5
Furnaces, Indus.	Feb.26	Price Indexes	Feb.19	Vacuum Cleaners	Feb.19
Furnaces, W. Air	Jan.22	Pumps, New Orders	Feb.5	Washers	Feb.19
Gear Sales	Feb.12	Purchasing Power	Feb.5	Water Heaters	Dec.25





Malleable Iron Castings
Thousands of Net Tons

	Shipments 1950	Shipments 1949	Unfilled Orders* 1950	Unfilled Orders* 1949
Jan.	62.9	71.9	62	126
Feb.	60.4	66.7	67	118
Mar.	66.3	72.1	70	102
Apr.	69.8	61.3	76	95
May	76.2	54.6	77	79
June	82.3	59.6	87	70
July	67.5	44.4	105	71
Aug.	86.0	58.1	132	61
Sept.	82.5	60.5	153	58
Oct.	90.0	57.2	160	54
Nov.	85.2	49.4	180	56
Dec.	91.5	57.4	195	61
Total	920.6	713.1		

* For sale. U. S. Bureau of the Census

Construction Valuation
(37 States)—In Millions of Dollars

	Total 1951	Total 1950	Building 1951	Building 1950
Jan.	1,043.2	730.9	881.9	578.8
Feb.		779.5		627.0
Mar.		1,300.2		1,075.3
Apr.		1,350.5		1,123.5
May		1,347.6		1,083.0
June		1,345.5		1,072.0
July		1,420.2		1,162.2
Aug.		1,548.9		1,295.1
Sept.		1,286.5		1,048.3
Oct.		1,135.8		956.7
Nov.		1,087.1		931.6
Dec.		1,168.4		969.0
Total		14,501.1		11,922.5

F. W. Dodge Corp.

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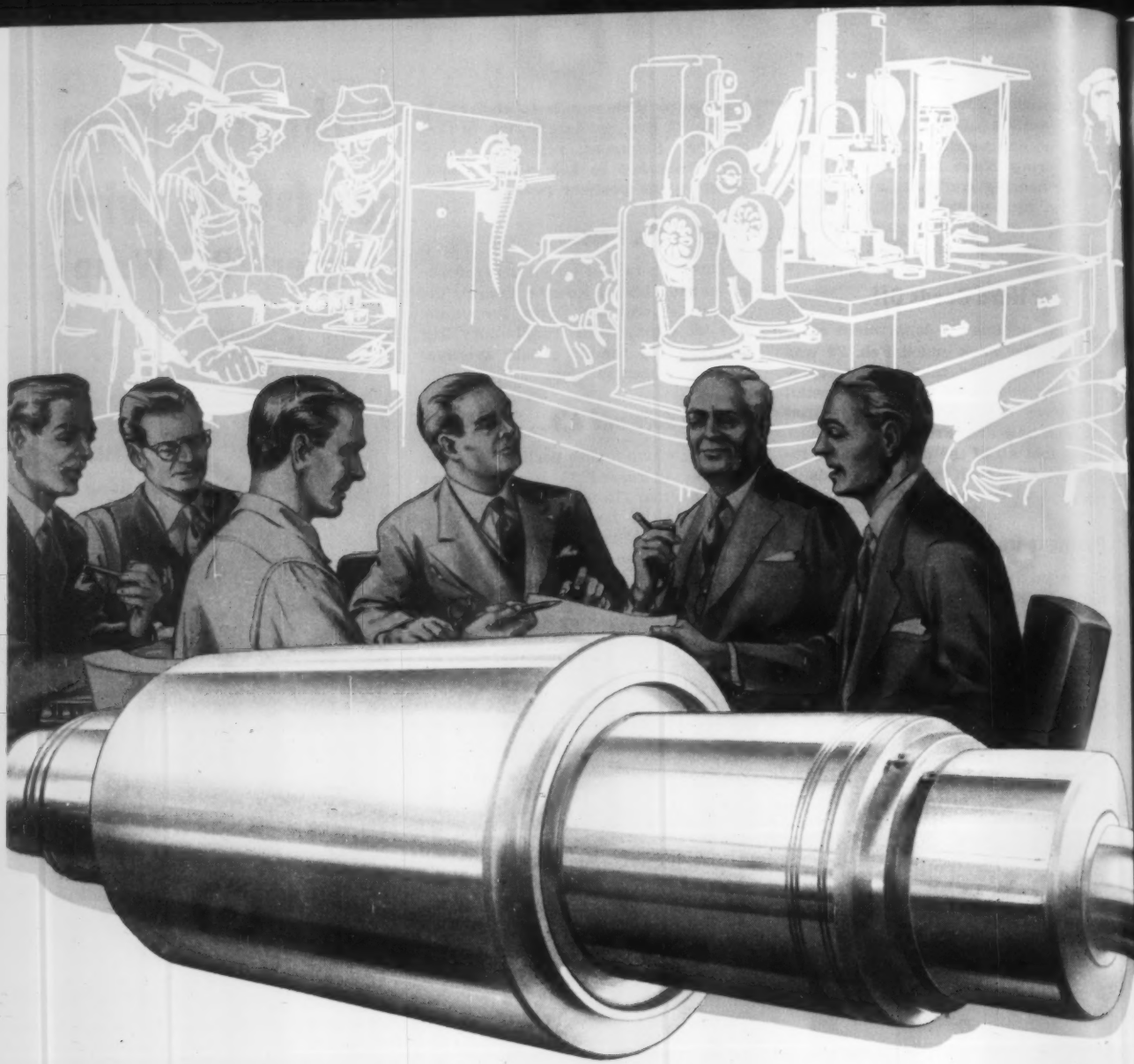
( ) Steel in process of fabrication.
( ) Electrical Machinery, Appliances, Products.
( ) Instruments and clocks.
( ) Fabricated Products—Cutlery, Hardware, etc.
( ) Ordnance Equipment.
( ) Transportation Equipment—Aircraft, Auto, Naval, Railroad, etc.
( ) Others:

(USE MARGIN for name, title, firm, address)



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PLANTS AT LIMA AND SPRINGFIELD, OHIO

Men of Industry

ROY PAULSEN
. . . general manager of A. C. Woods & Co.

JOHN E. CARROLL
. . . V. P.-sales, American Hoist & Derrick

CYRIL GRINDROD
. . . Dole Valve vice president

Roy Paulsen was appointed general manager of **A. C. Woods & Co.,** Rockford, Ill., subsidiary of Kropp Forge Co. Mr. Paulsen formerly was manager of the sales and engineering office of Allied Structural Steel Co., Chicago, and had previously been with Duffin Iron Co. for 20 years.

Frederick J. Griffiths was elected to the board of directors, **Follansbee Steel Corp.,** Pittsburgh. He has been president of Central Steel Co., Republic Research Corp. and Timken Steel & Tube Co. Since 1947 he has had offices in Massillon, O., as an independent steel consultant. Mr. Griffiths also holds directorships in Eaton Mfg. Co., Inland Investors Inc., and Cleveland Graphite Bronze Co., all of Cleveland.

John Mikulak was appointed assistant to the vice president in charge of manufacturing, **Worthington Pump & Machinery Corp.,** Harrison, N. J. He joined Worthington's subsidiary, Electric Machinery Mfg. Co., Minneapolis, remaining until 1944 when he became associated with American Car & Foundry Co. He served the latter company successively as chief engineer of its welded products division and senior research engineer, specializing in development of welded products and methods.

R. F. Chaffin was appointed electrical engineer for all plants of **Crucible Steel Co. of America,** Pittsburgh. **R. S. Hurtt** succeeds Mr. Chaffin as superintendent of electrical maintenance department at the Midland Works, and **John F. Kostelac** succeeds Mr. Hurtt as assistant superintendent.

John E. Carroll, general sales manager, **American Hoist & Derrick Co.,** St. Paul, was elected vice president of sales. He joined the company in 1937 and resigned in 1945 to manage the construction machinery division and become a partner in the firm of Harron, Rickard & McCone Co. of southern California. He rejoined American Hoist as general sales manager in 1949.

Personnel changes at the Pueblo, Colo., plant of **Colorado Fuel & Iron Corp.** include: **Rudolph Smith,** named works manager, a position which has not been filled since February, 1949, when **Jay J. Martin,** then works manager, was elected vice president in charge of operations; **George Grosvenor,** promoted to succeed Mr. Smith as superintendent of the open-hearth department; **Iver T. Ellingboe,** made assistant superintendent of the department to succeed Mr. Grosvenor. **Harold Gumma** was promoted to assistant superintendent of rolling mills to assist **Victor Johnson,** recently made rolling mill superintendent.

Herbert E. Smith was elected a director and member of the finance committee of **United States Steel Corp.,** New York. He succeeds the late **Robert C. Stanley.** Mr. Smith is chairman of the board and chief executive officer of United States Rubber Co.

Dale D. Spoor, manager of the equipment sales department of **Air Reduction Sales Co.,** a division of Air Reduction Co. Inc., New York, was granted a leave of absence to serve with the National Production Authority, Washington.

Cyril Grindrod was elected a vice president, **Dole Valve Co.,** Chicago. He has been plant manager.

William E. Mahin, director of research at Armour Research Foundation of Illinois Institute of Technology, Chicago, was named director of the metallurgical projects division of a new metallurgical advisory board of the **National Research Council.** Mr. Mahin will spend three days each week in Washington, with the remainder of his time devoted to research administration at the foundation.

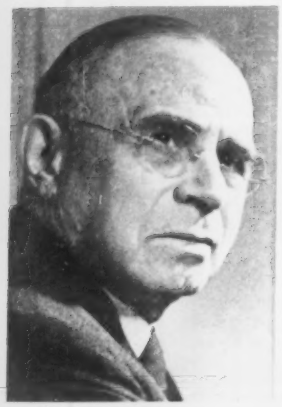
Newly elected vice presidents of **John Meck Industries,** Plymouth, Ind., are: **Russell G. Eggo,** who becomes executive vice president in addition to secretary; **B. L. Bethel,** vice president in charge of purchasing; **Charles E. Palmer,** vice president in charge of production; **Lewis G. Woycke,** vice president in charge of engineering; and **Charles L. Hubbard,** vice president in charge of planning.

Independent Pneumatic Tool Co., Aurora, Ill., appointed as branch managers: **John B. Dempsey** to Detroit to succeed **Robert G. Faverty,** appointed managing director of Armstrong-Whitworth & Co., Pneumatic Tools Ltd., new Thor subsidiary in England; **Edward W. Krantz,** Pittsburgh manager to succeed Mr. Dempsey; **William J. McGraw,** New York manager to succeed Mr. Krantz; **Clarence B. Bergren,** Cleveland manager to succeed Mr. McGraw.

S. Frederick Magis is general manager of **Siderurgica Venezolana** "Sivensa" S. A., Caracas, Venezuela. He formerly was consultant on produc-

tion of steel and finished steel products.

Dr. John F. Thompson, president, **International Nickel Co. of Canada Ltd.,**



DR. JOHN F. THOMPSON
. . . new chairman, International Nickel

New York, was elected to the additional office of chairman of the board of directors succeeding the late **Robert C. Stanley. Dr. Paul D. Merica,** executive vice president and a director, was elected a member of both the executive committee and the advisory committee.

James W. Rowe, vice president and general manager of the Birmingham plant of **Lamson & Sessions Co.,** Cleveland, was elected a director to succeed the late **George S. Case.**

Gerald E. Smart was named a plant engineer assisting **J. J. De Windt,** general superintendent of maintenance, time study and tool design at **Allis-Chalmers Mfg. Co.'s** Norwood, O., works. **Dwight H. Lory** was appointed to the works' electrical sales and engineering department.

Chester W. Schweers was named director of sales of the general machinery division, **Allis-Chalmers Mfg. Co.,** Milwaukee. He has been associated with the division sales organization for more than 20 years.

Benedick A. Marsh was appointed West Coast secretary of **Liquefied Petroleum Gas Association,** Chicago, to succeed **R. W. Dorst,** resigned to become assistant to general manager, Chemical Process Co., Redwood, Calif.

Lawrence V. Nagle, vice president and national sales manager, **Udylite Corp.,** Detroit, was elected to the board of directors.

Battelle Memorial Institute, Columbus, O., appointed **Dr. Ivor E. Campbell** supervisor of research on chemical problems in nonferrous metallurgy, and **Dr. Robert I. Jaffee** as supervisor of research in nonferrous physical metallurgy.

S. W. Scott was appointed Pacific district manager for **Graybar Electric Co.** with headquarters in Los Angeles. He succeeds **H. L. Harper,** who will retire in April after heading up the Pacific territory for 19 years. Mr. Harper will serve in an advisory capacity until his retirement.

Gervais W. Trichel, former chief of the Army Ordnance Department's rocket development program and one-time adviser to the director of the atomic bomb project, was appointed a vice president and member of the board of directors of **Fargo Motor Corp.,** fleet sales subsidiary of Chrysler Corp., Detroit.

Precision Metalsmiths Inc., Cleveland,

R. A. J. WELLINGTON
. . . Precision Metalsmiths V. P.-sales

promoted to new positions **R. A. J. Wellington** as vice president in charge of sales, and **Richard W. Devans** as treasurer and assistant to **Robert R. Miller,** company president. Mr. Devans continues in charge of purchasing, having served in that capacity as vice president.

A. R. Roskilly was named manager of the government-owned plant in Tonawanda, N. Y., which will be reopened soon by **Chevrolet Motor Division, General Motors Corp.,** to make jet aircraft engines for the Air Force.

Armco Steel Corp., Middletown, O., elected **L. F. Reinartz** vice president in charge of special operating development; **G. D. Tranter,** manager of the Middletown division; **D. S. Holstein,** general superintendent in charge of rolling and processing at the Middletown division; and **O. E. Clark,** general superintendent in charge of blast furnaces and melting at that division.

Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., appointed **Emmett F. Harding** as Port Chester, N. Y., sales manager in addition to his present duties as manager of screw sales. **Henry McCarthy** is assistant sales manager, Port Chester. These changes resulted from the appointment of **Robert H. Burdsall,** former Port Chester sales manager, to the new post of manager of market development and advertising.

Appointments of eight division heads of the new **Fairless Works** of United States Steel Co., Pittsburgh, to be built near Morrisville, Pa., are: **Amos C. Bledsoe,** division superintendent, sheet and tin; **John F. Brownlee,** superintendent, production planning; **Kermit L. Johannsen,** division superintendent, central maintenance and utilities; **Theodore J. Koenig,** division superintendent, rolling; **Fred B. Lafferty Jr.,** superintendent, industrial relations; **Emerson R. Miller,** division superintendent, blast furnaces, coke ovens and by-products; **Maynard J. Rich,** plant industrial engineer; and **Lester R. Walker,** chief metallurgist and inspector.

E. C. Atkins & Co., Indianapolis, appointed: **Ray F. Ellis,** assistant director of sales; **Augustus Vogel,** general sales manager, industrial division; **H. Waddle,** general sales manager, mill division; and **A. L. Martinson,** general sales manager, hardware division.

Walter H. Roesing was appointed district sales manager of certain areas of New York, New Jersey and Connecticut for **DeWalt Inc.,** Lancaster, Pa. He was eastern sales represen-

WALTER H. ROESING
. . . dist. sales mgr., DeWalt Inc.

...ative of American Machine & Foundry Co., New York, parent company.

Harold **Anderson** was appointed district sales manager of the Jamestown, N. Y., office of **Brace-Mueller-Huntley Inc.**, Buffalo steel warehouse firm.

Robert I. **Baxter** was appointed manager of sales, **Penn Steel Castings Co.**, Chester, Pa. He was New York district sales manager.

Robert L. **Teeter** was appointed manufacturing engineer, and **Alfred R. LaCasse** as manufacturing analyst for the chemicals division of **General Electric Co.'s** chemical department, Pittsfield, Mass.

Leslie **M. Cassidy,** president, **Johns-Manville Corp.,** New York, was elected chairman of the board and chief executive officer to fill the vacancy created by the death of **Lewis H. Brown. Adrian Fisher,** vice president-production and general manager, asbestos fibre division, was elected president.

Federated Metals Division, American Smelting & Refining Co., appointed **Walter C. Keil** as assistant superintendent in charge of smelting operations, and **Joseph D. Allen Jr.** as assistant superintendent in charge of manufacturing at its Newark, N. J., plant.

Roy **E. Carter,** chief engineer, Sharon Steel Corp., Sharon, Pa., was elected vice president in charge of engineering for **Furnace Engineers Inc.,** Pittsburgh.

Carl **L. Kalitta** was appointed chief design engineer, Warner Division, **Clinton Machine Co.,** Detroit. He joins Warner after ten years spent with Vickers Inc.

Arcos Corp., Philadelphia, opened a West Coast office and warehouse in Los Angeles and appointed **B. E. David** district manager.

CARL M. RIEFKIN
elected V. P. Newport Steel

ROY I. MacARTHUR
supt. aircraft engine mfg., Buick

Carl M. Riefkin was elected vice president, **Newport Steel Corp.,** Newport, Ky. He has been associated with the firm for the last 27 years.

Robert L. Williamson was named product manager in charge of the sale of die castings for **Aluminum Co. of America,** Pittsburgh. He was manager of the Kansas City district sales office where he is succeeded by **Rodney M. Beck,** formerly assistant district sales manager, Cincinnati.

C. H. Morse Jr. was appointed manager, locomotive service department, railroad division, **Fairbanks, Morse & Co.,** Chicago. He succeeds **J. E. Justus** who retires Apr. 1, at which time he will devote part time to special assignment, assuming the title of special assistant to the railroad division manager.

Paul A. Wick was appointed assistant to the president, **Rockwell Mfg. Co.,** Pittsburgh.

James E. Gallagher was appointed eastern division sales manager, **Cory Corp.,** Chicago.

Joseph F. Kerigan was appointed works manager, Delaware tank plant, **Chrysler Corp.,** Detroit.

Roy I. MacArthur was appointed general superintendent in charge of aircraft engine manufacture, and **Don F. Taylor** as assistant general superintendent in charge of tank transmission manufacture for **Buick Motor Division,** General Motors Corp., Flint, Mich.

Morris L. Hicks was appointed manager, Philadelphia district office, **Dravo Corp.**

Gilbert F. Stenger was named fleet sales manager, truck tire sales department, **B. F. Goodrich Co.,** Akron. He succeeds **Howard F. Kidwell,** transferred to Detroit in the company's automotive, aviation and government division.

R. W. Brisky is the Grand Rapids, Mich., representative of **Electric Products Co.**

Perfection Stove Co., Cleveland, appointed **J. D. Stevenson** assistant export manager. **L. S. Chadwick,** since 1922 president and chairman of the board, will retire Mar. 13.

T. M. Evans of Pittsburgh was elected to the board of directors of **White Motor Co.,** Cleveland. He is president of H. K. Porter Co. Inc.

OBITUARIES...

Harry W. Schuetz, 66, vice president, **Pittsburgh Screw & Bolt Corp.,** Pittsburgh, died Mar. 1. He was associated with the company since 1928 as assistant to the president and later as vice president in charge of its Colona Division.

Joseph N. Moorhead, retired works manager, Buffalo plant, **American Magnesium Corp.,** died Feb. 24 in West Palm Beach, Fla.

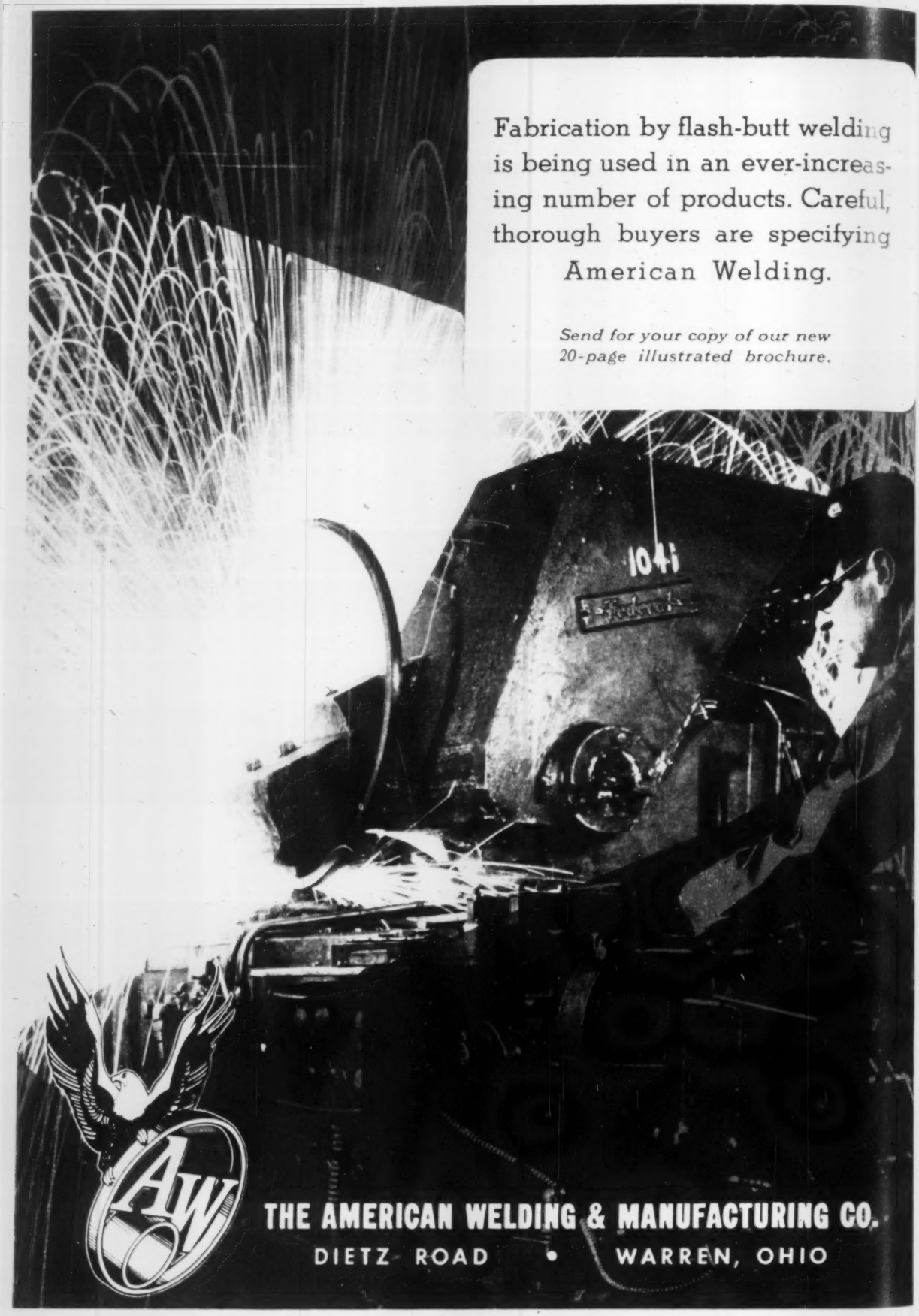
Herman H. Ottens, vice president, **Cupples-Hesse Corp.,** St. Louis, died Feb. 19.

William P. Anderson, 76, retired founder of **Ferro Concrete Construction Co.,** Cincinnati, died Feb. 26.

Charles E. Gray, 65, works manager, **Rome Mfg. Co.,** Rome, N. Y., a division of Revere Copper & Brass Inc., died Feb. 26 following an operation.

Stanley Bayless, 45, director of sales in the United States and Canada for **Thompson Products Inc.,** Euclid, O., died Feb. 28.

Victor R. Browning, president, **Victor R. Browning & Co. Inc.,** Willoughby, O., died Feb. 15.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Production AND Engineering
NEWS AT A GLANCE

MILLIONS FOR COBALT—Out in Utah at the Blackbird mine near Forney and at Howe Sound's refining plant west of Garfield, there's good news tonight because $30 million is being spent to build facilities for mining and refining cobalt ore. Final electrolytic refining will be done at Salt Lake and it is the hope to squeeze out around 2 million pounds of the pure metal annually, ending the country's dependence on foreign cobalt ores. The Utah ore assays 14 pounds of cobalt, 28 pounds of copper and traces of gold per ton. Who wants the gold these days?

CO-ORDINATE PART AND PROCESS—By proper correlation of tool selection and microstructure of the part, machining of a Ford pinion forging is handled by a single automatic lathe having ten tools operating simultaneously replacing five machines used prewar, with appreciable savings in floor space, total power, material handling and all fixed costs. The achievement (p. 80) is but one shining example of what can be realized from thorough understanding of the machining process, plus control of tools, materials and machines.

EASY READING—Elephant-size instruments are appearing on some types of new heavy equipment. A 27-foot boring mill, for example, is reported to carry direct-indicating electric meters 20 inches in diameter with 8-inch indicator needles. Machine speeds and feeds can be noted accurately a good distance from the meters.

REVERSE DRY CELL ELEMENTS—A new type of dry cell battery is showing considerable promise, particularly where there is demand for extra capacity from such cells. A simple switch was made from the conventional design which has a drawn zinc can as an outer shell, into which are placed the necessary chemicals and a central carbon electrode. In the new arrangement the central element is zinc and the outer shell is made of compacted carbon. This permits a considerable reduction in the amount of zinc required per cell and also makes it possible to pack more active chemical into the cell, increasing its life. Slightly higher cost is involved, but this is said to be more than offset by the additional oomph it shows. Incidentally, the battery people say they sell more dry cells to foreign countries, notably India and China, than to domestic markets. Lack of centralized power and light facilities is the explanation.

ORE CONCENTRATED IN KILN—Twenty years ago Krupp in Germany figured out a system for reduction of low-grade iron ores in a rotary kiln, using powdered coal as fuel and coke breeze as a reducing agent. It worked, but the metallic iron produced was too high in sulphur for use in steel furnaces. However, the setup appeared suitable for beneficiation of low-grade siliceous ores and is being so operated in Czechoslovakia (p. 92). Product of the kiln is a sort of glassy slag which is ball milled, screened and passed over magnetic separators to rescue the iron, while nonmagnetic tailings become commercial crushed slag. Costs are not too high, suggesting possible adaptability to concentrating low-grade U. S. ores at the mines.

WONDER METAL SCORES AGAIN—Titanium carbide ring thread gage given a prolonged series of tests on a variety of materials—cast iron, steel, aluminum, cadmium and silver plate—has shown wear ratio far beyond any steel alloys regularly used for these gages, convincing its progenitors that they may be at a major turning point in gage materials. Particularly impressive were long periods of service in production gaging of spark plug threads.

PAYDIRT FROM EUROPE—If you have a production spray painting problem and are not aware of the many advantages of heating the paint before spraying, a check on them might be in order. Simple heating devices have been perfected (p. 85), and they have been proved to reduce overspray and to cut rejects arising from poor coverage, sags and other defects. The idea is said to have come from Europe where there has always been acute consciousness of material conservation techniques. Another case in point is a German-designed trepanning lathe (p. 87) now being introduced in this country, for coring out large diameter rounds such as gun barrel forgings.

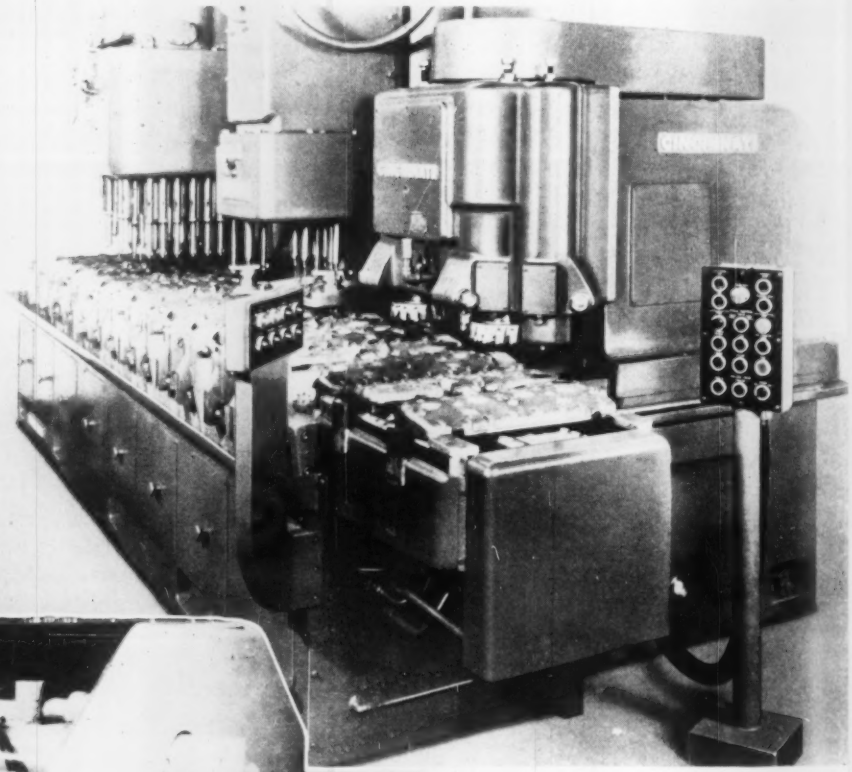
—A.H.A

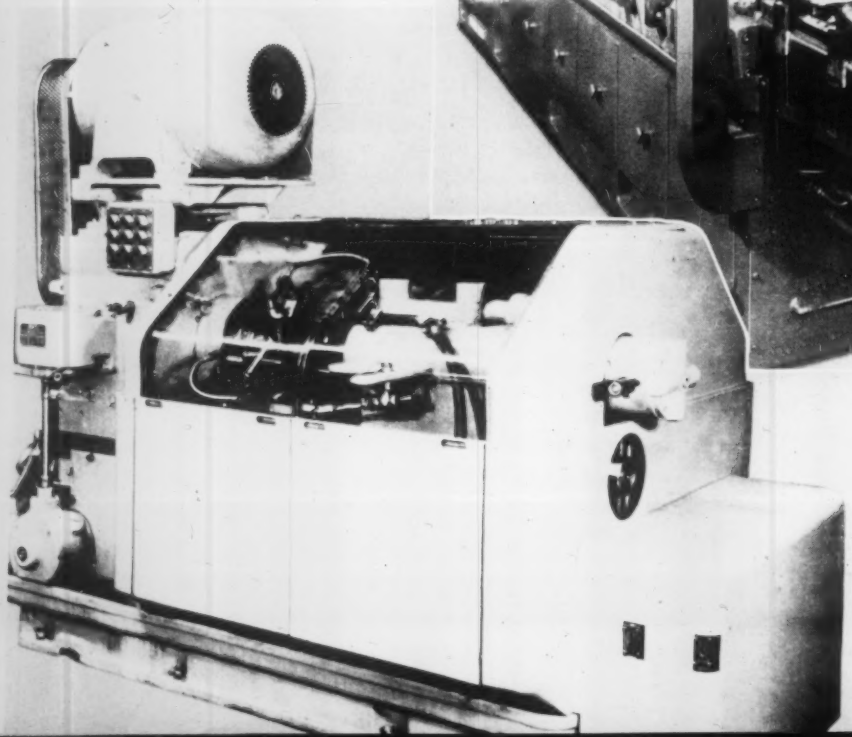
Maximum performance from machine tools calls for close analysis of many factors, ranging all the way from wattmeter graphs of power consumption to the cutting tools themselves. Once properly co-ordinated, they will pay off handsomely, as shown in the accompanying research report.

GETTING THE MOST O

A COMPREHENSIVE program of machinability research, initiated late in 1948 by the Air Force and budgeted at upward of $100,000 was undertaken by a joint committee including representatives of Curtiss-Wright Corp., Cincinnati Milling Machine Co., Ford Motor Co., Metcut Research Associates, University of Cincinnati and Massachusetts Institute of Technology. First meetings were held at the invitation of Del S. Harder of Ford and the project was placed in the hands of Roy T. Hurley, then of Ford and now president of Curtiss-Wright. The material was integrated and the program co-ordinated by Dr. Michael Field of Metcut Research Associates and Vincent Gorguze of Ford. Summary of the entire study has been compiled in book form by Curtiss-Wright, although there has been only limited distribution of the material. Basic idea behind the activity was a practical effort to discern how to increase production and reduce costs through a better understanding of the machining processes and control of materials, tools and machines. The information presented herewith is the third of six sections making up the report, and is published with permission of the Air Force and with the co-operation of the participating organizations.

Right—V-8 cylinder heads are face milled, spot faced, drilled and tapped on this multiple station, straight line automatic transfer machine, at a continuous rate of 118 pairs per hour. The 7½-inch diameter face mill shown at the right machines the cast iron at 400 fpm





Left—Pinion blanks come off this 50-hp automatic lathe at a rate of 145 per hour. Cutting time is 8 seconds and cycle time is 21 seconds, floor to floor

OUT OF MACHINES AND TOOLS

HIGH speed, high power and automatic operation are the salient features of modern production machinery, and the trend in this direction is ever-increasing. From the economic, competitive standpoint, or from the military-preparedness standpoint, it is essential that U. S. industry achieve the highest production levels, at the same time reducing costs and improving production efficiency.

This trend toward higher productivity has been accelerated by the introduction of sintered-carbide cutting tools. At the same time, the production process as a whole has been vastly speeded up by utilizing automatic loading and unloading fixtures, and by applying automatic controls to spindles, tables and slides, which reduce the total floor-to-floor cycle time almost as much as carbides reduce the actual cutting time.

The high speeds and the higher loads accompanying multiple-carbide tooling associated with newer production machines and processes demand a higher degree of machine perfection. It is therefore vital that new machines possess the utmost in rigidity, dynamic balance of all rotating and reciprocating elements, and have bearings of high load and speed capacity.

Experience has shown that new machines so designed can provide production increases from five to ten times the rates possible with conventional machines. As much as double the production is possible using existing machines in good condition when optimum cutting speeds, feeds, the correct tool material and most machinable microstructure are applied.

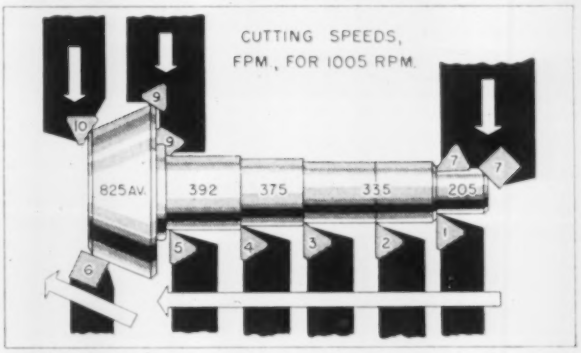
While new machines are preferable in order to take fullest advantage of recent advances in tooling and machining methods, all of the approaches described herein are applicable to existing machine tools as well. The specific machine tool testing methods which follow should be applied to new and old machines alike in order to locate and correct defects.

The principles of testing are presented first. Their application and correlation with tool and material selection are summarized in a high-production, new machine example.

Meeting the Specifications — Production machine tools are now designed with a specific operation and production rate as the objective. To assure that new machinery actually meets the contract specifications, a technique of acceptance trials on the builder's floor has been developed. These trials check production rate, part accuracy and surface finish, tool life and the general performance and operating qualities of the machine. And the tests go further: Power and vibration analyses are made in order to uncover basic weaknesses which could show up much later in actual service.

Execution of these tests before releasing a machine for shipment provides excellent assurance that it will do its job when installed. Furthermore, if troubles are brought out by the tests, the best place to remedy them is in the builder's plant where his engineering staff and shop are available for rapid and proper corrections. Utilizing the design and construction experience of the men who actually built the machine and all its complex components is far more efficient than working out difficulties on the production floor after a breakdown has occurred.

All controls, particularly the electrical and hydraulic controls, are subject to strict specifications and standardization, through the efforts of joint-industry committees (JIC), builders and manufacturers associations, and according to the standards established by the customer himself. This standardization has gone a long way toward facilitating routine maintenance and reducing spare parts inventories, with the overall purpose of minimizing downtime.

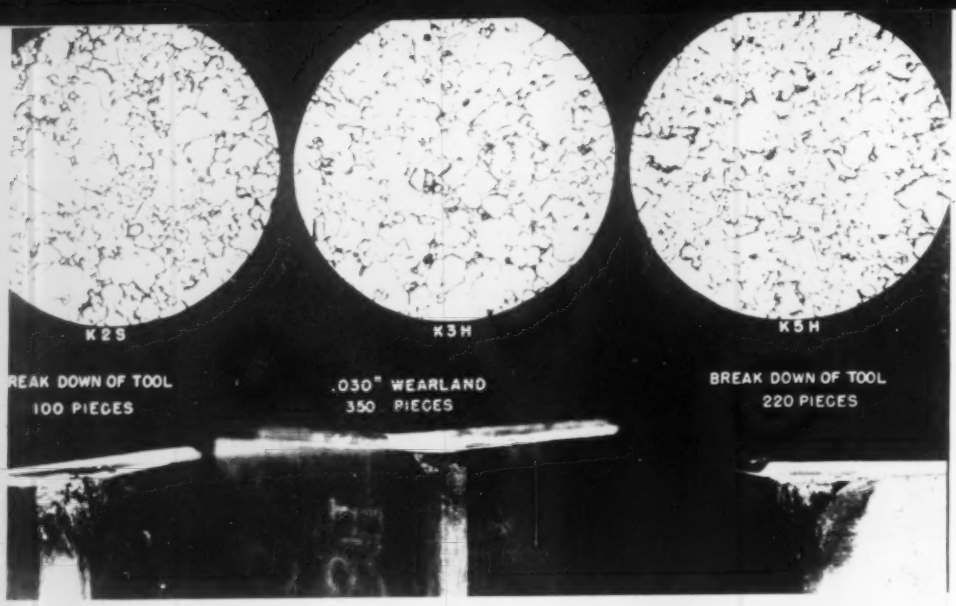


Ten tools operating on two slides simultaneously turn, face and chamfer all pinion surfaces. Cutting speed ranges from 950 fpm maximum to 205 fpm at the smallest diameter. Feed is 0.015-inch per revolution. Tool number 6, operating at 825 fpm average, has the limiting tool life

Vibration Analysis—Vibration is an important factor which may cause poor tool life, poor surface finish and difficulty in holding tolerances. It can eventually lead to failure of various machine components and excessive downtime. Principal causes of vibration are: Improper gear meshing; dynamic unbalance of rotating parts; bearing imperfections; faulty electrical or hydraulic controls; looseness in slide and screws; lack of rigidity; chatter caused by tool geometry; and interrupted-cutting conditions.

The elimination of harmful vibrations often requires a highly specialized type of analysis, because many of the above factors can exist simultaneously, and often the manifestations of vibration are exhibited at a point quite remote from the exciting source.

In general, the approach is to identify vibration



Several carbide grades were tried, and the tests indicated K3H as giving the longest tool life. At 825 fpm, K2S (left) and K5H (right) broke down after as few as 100 pieces while K3H produced 350 pieces with 0.030-inch wear. This is tool No. 6; others last much longer

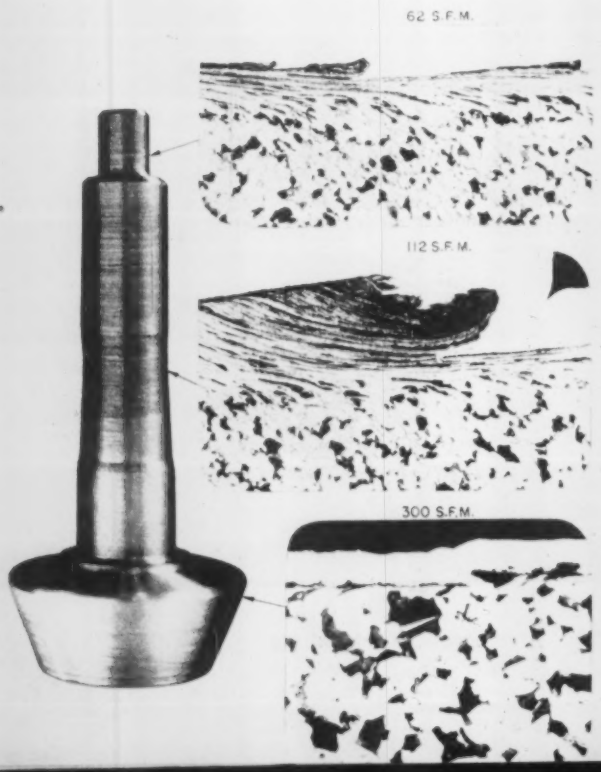
according to its frequency and amplitude at many points throughout the machine and then try to match the frequencies observed against known factors of revolutions per minute at different points, the number of teeth in each gear rotating at a certain speed and the possible harmonics. If a similarity is found that location is immediately suspected and then studied carefully to see if it is at fault. Sometimes vibration can be tracked down by measuring amplitude or intensity at various points. Locations of highest amplitudes or greatest intensities of one vibration usually identify, if not the actual source, at least some component that is extremely sensitive to that particular frequency.

Here are two examples:

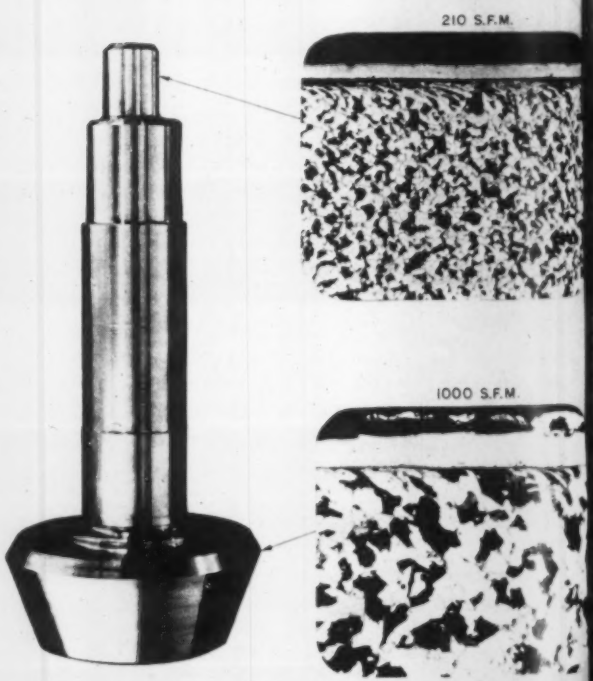
Both tool life and surface quality were much below expectations on the turning of a Ford pinion

Above—Cycle time and peak motor loads are shown on the power recording chart. The area under the curve represents the total energy consumed in kilowatt hours. Average horsepower is 18 and the peak loads do not exceed the motor's maximum torque so the motor size is adequate

Speed of 300 rpm and high-speed steel tools produced this piece. Finish is about 500 microinches



Speed of 1000 rpm and carbide tools produced this piece. Finish is 200 microinches or better



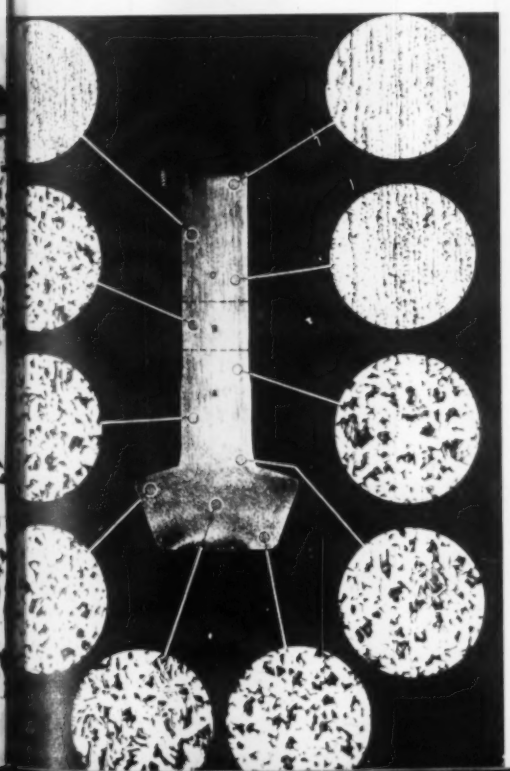
blanks. Vibration analysis at the tool indicated a frequency that checked with the chatter marks on the work. (Number of chatter marks on the circumference times spindle rpm equals the vibration frequency.) This eliminated spindle unbalance as the probable cause, and pointed instead to the tool and its support. Vibration amplitude at the cutting edge was much higher than at the shank end, indicating insufficient rigidity. Vibration was eliminated by providing a heavier toolshank and reducing overhang.

On a shaft turning job, vibration analysis was started at the cutting edge and, working back, no appreciable difference was noted in vibration between tool and toolholder, or between toolholder and cross slide, but a considerable reduction was noted between the carriage and the ways. Further investigation located the trouble in loose gibs.

These are simple examples. Often, the search must be continued into fixtures, structural members and all the moving parts before the trouble is located.

Measuring Instruments—The essential elements of a vibration-analysis setup comprise a pickup, an amplifier and a vibration meter. A pickup detects the mechanical motion and converts it into an electrical signal. The amplifier magnifies the electrical signal which is then indicated in the desired mechanical units on a vibration meter. Often, the vibration is so complex that a cathode-ray oscilloscope, to graph the actual wave form, is used in analyzing the shape. Pickups are available which measure displacement, velocity, acceleration or amplitude, depending on the principle of operation.

Forging is performed at 2200° F while the shank end remains cold. The hot end transforms into austenite, forming large grains, while the cold end retains its as-rolled structure. Salt-bath annealing at 1200° F transforms the austenite into ferrite and pearlite maintaining large grain size and uniform distribution. Note banding and grain size at the cold end



The frequency of a cyclical motion such as rotation or vibration may be measured in several ways. Using the vibration-analysis circuit described above, an audio oscillator or signal generator is introduced which can duplicate the frequency of vibration enabling measurement by comparison with the oscillator's known frequency.

The Strobotac is an instrument which combines an audio oscillator with a neon spotlight. The oscillator control adjusts the number of flashes per second until the motion appears to be stationary. The two are then synchronized, and the Strobotac dial indicates the unknown frequency.

Power Analysis—Motor selection is an important consideration on new machine tools. Preliminary tests always include a graphic recording of motor load with the machine running at its designed production rate. If possible, tests are also conducted at higher rates to observe the power increase.

Motor capacity is selected on the basis of average power consumption in kilowatt hours per hour and the pullout torque. If the peak operating load is within the pullout torque, and the overall average power within the motor's horsepower rating, short durations of high overloads during the cutting cycle can be ignored.

Choice of suitable power measuring equipment depends on the information desired. Clamp-on ammeters permit quick checks of motor load with reasonable accuracy and over a wide range. No interruption to production is required for hookup. Recording wattmeters graph instantaneous power against time, showing the exact motor load at any point in the cycle as well as the power consumption.

Proper instrumentation for power measuring helps evaluate the machining process itself. In addition it provides a check on individual machines and their production rates, showing which operations are efficient and which are not, in terms of total production in parts per hour and the amount of dead time in each cycle.

Production analyses of these power recordings have spotted and eliminated inefficiencies of various kinds. In one instance, cycle time was reduced 10 per cent by a slight change in tool phasing where formerly there had been a no load point in the machining cycle. Investigation of excessive downtime on another operation, shown by the power recording, brought out a chip disposal problem, a shortage of tools and inefficient loading and unloading motions.

Stress Analysis—Machine tool testing is still in its infancy. The tests outlined here are primarily acceptance tests and their use for machine design or research and development constitutes another field entirely. Stress analysis, for example, is a science which is just beginning to find application in the machine tool field. At present, its major applications have been the investigations of actual failures and their correction, rather than basic design studies.

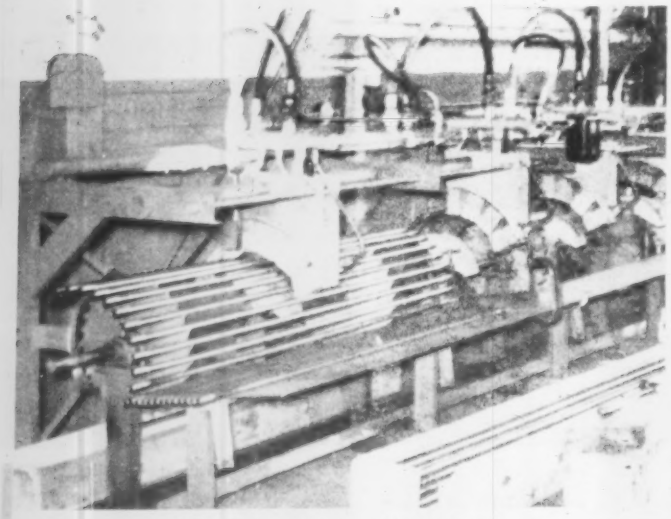
However, with the comparative simplicity of the widely used, bonded wire resistance strain gages, and the commercially available strain indicators which accompany them, it is somewhat surprising that stress and strain measuring has (*Please turn to Page* 106)

Copper Tubes Spot Annealed In Deoxidizing Atmosphere

By W. W. SWARTHOUT
Chief Engineer
Acme Industries Inc.
Jackson, Mich.

MANUFACTURE of shell and tube-type Freon condensers for refrigeration and air-conditioning equipment until recently presented a problem in harmonics. The copper water tubes vibrated in unison with the strokes of the gas compressor. In the early days of the industry, the compressors had frequencies so much lower than the vibration frequency of the tubes that no such trouble presented itself. Stepping up the frequency of the compressors made it necessary to increase the frequency of the tube by reducing the length left free to vibrate.

Condensers in this category are made in several designs and in a range of sizes up to 655 tons refrigerating capacity. Shells are heavy wall seam-



In this special rack any length of tube up to 20 feet can be spot annealed in 5 seconds

less steel pipe. Heads are cast iron, cast steel or fabricated steel, according to type. Fixed tube sheets and "straight through" tube construction permits simple mechanical cleaning of the tube on removal of the water heads or cover plates.

Tubes are $\frac{5}{8}$-inch integral fin copper tube. This type of finned tube is composed of one piece of metal. The fin is an integral part of the tube wall body. Spacing and fin height are chosen to give a total tube surface 300 per cent as great as obtained with bare tubes, with heat transfer value in direct proportion.

To restrict unsupported tube lengths to a maximum of 4 feet, $\frac{5}{8}$-inch cast iron tube supports are inserted in all condensers over 4 feet long. The supports are designed to furnish adequate gas passage area between the tube and shell. This insures proper gas distribution as well as liquid drainage.

Tubes must fit the support tightly to eliminate noise and vibration. This requirement introduced a few problems. The integral fin copper tube is work-hardened during manufacture, making it difficult to work with an expanding tool. Also, it is desirable from an engineering standpoint to have good ductility in the tube wall adjacent to the support.

Spot annealing of the tube was indicated. This presented the problem of removing the oxide scale after annealing, because it is essential to avoid the presence of foreign matter in the Freon chamber.

Here the engineer took a leaf from the silversmith's notebook. In the manufacture of some types of equipment Acme uses the Gasflux brazing process in which the flux is picked up by the fuel gas in a special container and carried into the flame at a uniform, controlled rate. If this same principle could be applied successfully to spot annealing the copper fin tube, there would be no oxide formation and consequently no cleaning would be necessary.

First a special annealing rack was developed. The frame is long enough to accommodate 20-foot tube lengths. Ratchet wheels to carry the tubes through the heating zone are mounted on a motor-driven shaft. Tubes are supplied with the fin formed on nearly the total length, about 2 inches being left plain at each end. These tubes are placed on the inclined feed shelf, picked up by the wheels, passed under the burners and then dropped into the box from which they are taken, ready for installation.

A Selas gas mixer and a heavy-duty Gasfluxer are installed at the far end of the annealing rack. The four Selas burners are adjustable as to position so that tubes of any length from 4 to 20 feet can be annealed in any desired locations. Each curved burner is faced by a curved refractory block which reflects the heat back to the under side of the tubes. Length of the annealed section is $2\frac{1}{2}$ inches. Immediately following each burner is a curved tubular burner which furnishes a city gas flame carrying the flux.

This is a "lazy", low-temperature flame, surrounding the tube during the critical cooling-off period when oxidation would normally occur. The copper tube will not oxidize while passing under the burner but if allowed to pass into the clear atmosphere it would oxidize immediately. By the time it has passed through the deoxidizing flame it has cooled sufficiently so that there is no further danger of oxidation.

When the annealing rack is adjusted and readied for operation, tubes can be treated at the rate of about 12 per minute. This rate is independent of the tube length and of the number of sections treated in each length, because all tubes have the same diameter and wall thickness.

HOT PAINT SPRAYING *Saves Finishing Materials, Labor*

By HENRY J. HOLTZ

SAVINGS in solvents, paint, labor are among the advantages that can be realized by hot spray finishing. Once discarded as impractical, the process is now highly successful and is used by many companies.

Spray finishing loses much of the solid pigment matter of overspray; this loss often is as high as 50 per cent. By applying paint that has been heated to 160 to 200° F, the overspray loss can be reduced by one-half. This is an important attribute of the process, with many metals now being allocated by government and more and tighter controls on metals used in paint possible in the future.

Paint manufacturers are users of considerable amounts of such metals as aluminum, cadmium, cobalt, lead, titanium, antimony and zinc. Most of these metals are now subject to government material orders or will be in the near future. Cobalt, for instance, is used as a dryer in about 95 per cent of all paint formulas; its shortage will be of serious consequence to the paint industry.

For most normal coats about 50 per cent of the solvent is saved by hot spray painting. Many solvents are themselves critical materials. Ethyl alcohol, benzene and methanol are examples.

Popular in Europe—Originally developed in Europe where material shortages are chronically acute, hot spray painting has seen a successful recent development. In Sweden, for instance, 90 per cent of all lacquers are now sprayed hot. The first tests with the process in this country were conducted prematurely and with insufficient technical developments to back them up; hence the method was generally discarded until recently.

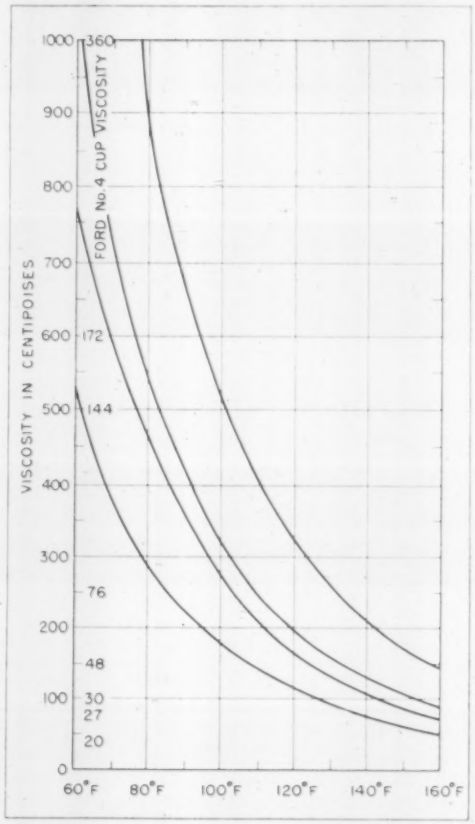
Look at the Record—With industry being increasingly cost conscious, this finishing process can show up on the credit side of the ledger in other ways. Rejects attributable to improper spraying, poor covering and sags can be reduced; one refrigerator manufacturer cut this class of rejects to 1/10 the number prevailing before paint heaters were installed. Air is saved, as that needed for atomization is less and coverage is effected with fewer coats. Fuel costs for baking are reduced as the hot spray process cuts the time required for baking, especially by infra-red. With lower atomizing air pressure and consequent reduction in spray fog, the volume of heated air exhausted by the spray booth can be reduced. Estimates place the cost of heating 100 cu ft of plant space at $60 to $75 per season in a climate like Chicago's.

It has been found that almost any finishing material can be sprayed. Various types of paint for all types of applications, lacquers and even such heavy materials as the underbody coating used on automobiles can be applied. Most paint manufacturers have special formulations for use with hot spray process.

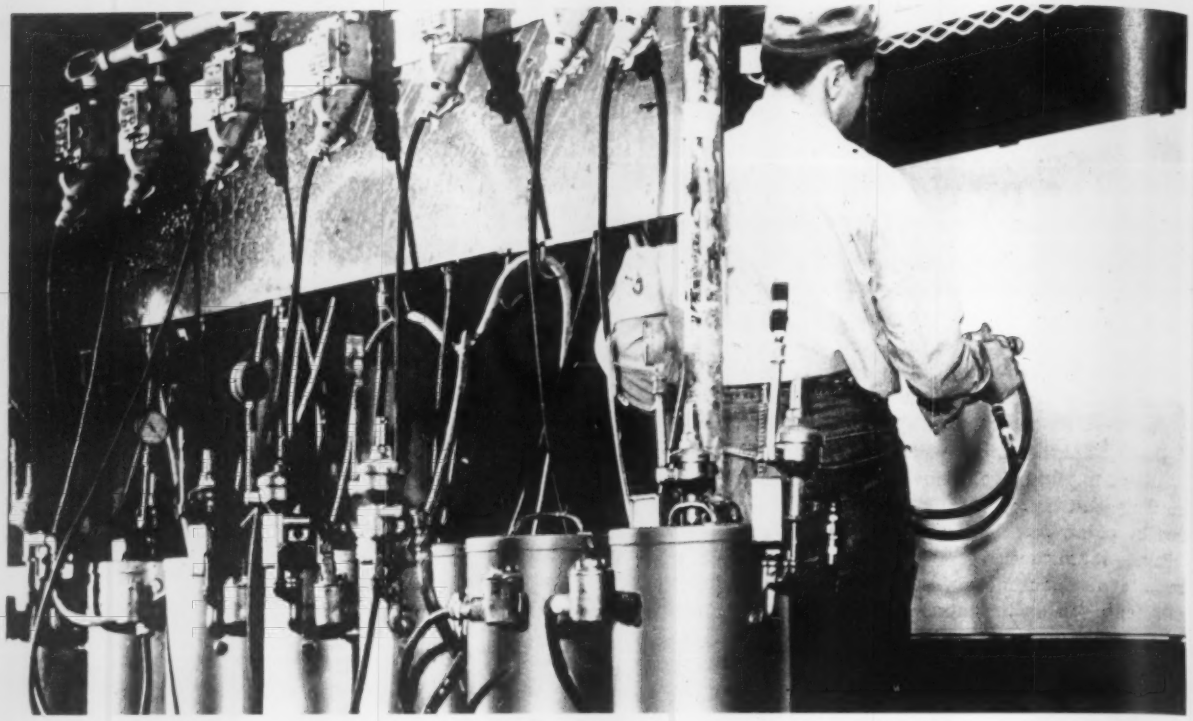
One of the difficulties encountered in developing the process has been the lack of a satisfactory method of heating the paint, due to its inflammable nature. This problem was solved by Bede Products Inc., Cleveland, by using an aluminum casting as the transfer medium. An alloy steel coil is imbedded in the casting, the paint flowing through this coil being heated by two 1000-watt electric cartridge heaters.

Easy Does It—Equipment for heating paint is easily placed in service. The heater is merely "spliced" into the plant air line and into the paint supply line. Once connected to the electric power source, it raises the paint to optimum temperature in 10 to 15 minutes. Paint can be drawn from the original paint container, a positive displacement pump eliminating need for pressure to feed the paint.

When painting is intermittent, the problem of its cooling in the hoses is solved by a circulating type heater. Driven by an air motor, this unit is capable of raising temperature of 12 to 14 gallons of paint 100° F in 1 hour. For continuous spraying, either



Graph showing decrease in viscosity of several nitrocellulose lacquers as temperature is raised from 60 to 160° F. Temperature-viscosity curves for paints and Glyptal insulating varnishes show the same tendencies. Courtesy Hercules Powder Co.



Reject-reducing installation of Bede paint heaters at E. F. Hauserman Co., Cleveland. Hot sprayed partition panels are found to have a heavier, more uniform coat of paint

manual or automatic, Bede has a noncirculating unit of similar capacity.

Should volume of finishing exceed the output of a single heater, additional units are employed; these are either connected in series or operated individually. When cleaning or changing color is necessary, the circulating model is provided with an attachment that blows all paint back to the original container. Flushing with the solvent completes the cleaning, but often is unnecessary.

Lincoln Electric Co., Cleveland, in applying synthetic enamel in two colors on its welders, is hot spraying in one full coat now what previously required one mist coat and one full coat. At E. F. Hauserman Co., also in Cleveland, hot sprayed partition panels receive a heavier, more uniform coat. Fewer rejects have resulted since this finishing process was instituted.

Better with Two than Six—Another company which has seen benefits of hot spray finishing materialize is Weber Dental Mfg. Co., Canton, O. It now applies two coats of lacquer on its equipment by hot spray. The finish obtained is reported better than that previously obtained by the application of six coats of lacquer.

By heating its yellow synthetic enamel for application to its excavating machinery, Thew Shovel Co., Lorain, O., is reducing finishing costs by spraying one mist coat and one full coat instead of one mist coat and two full coats formerly used. It is spraying over two mils of thickness using the paint heating equipment.

Large Fermentors Completed

Alloy Fabricators, Perth Amboy, N. J., a division of Continental Copper & Steel Industries Inc., announces it has completed seven 15,000 gallon fermentors for the production of antibiotics for Merck & Co. Inc. manufacturing chemists. At the present time Merck & Co. is expanding its facilities for the production of antibiotics.

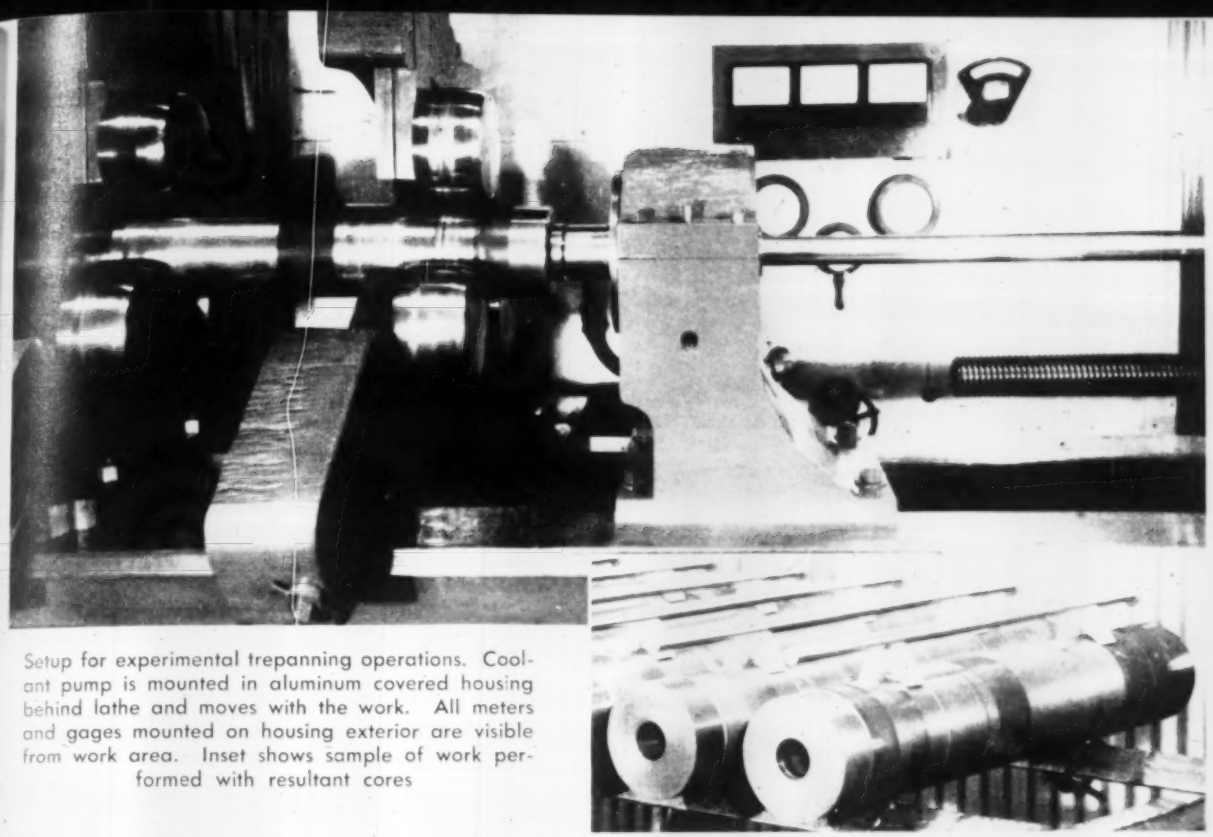
Fermentors are 12 feet in diameter and 24½ feet high with all portions of the tank which are in contact with the charge or its vapors made of stainless steel. Each fermentor is equipped with stainless steel turbine agitators for mixing and stainless steel helical pipe coils for steam heating. A steel shell surrounds the stainless steel tank for the circulation of cooling water within a space between the inner stainless steel tank and the outer steel jacket.

Emulsion Cleaning Process

A cleaning process for all metals has been worked out in the laboratories of Northwest Chemical Co. Detroit, utilizing emulsion cleaners of the W/O type based on petroleum products. The system is said to be equivalent to spraying the work with solvent, while immersed in water, rather than in the air.

The two-phase bath is built up of petroleum solvent treated with a small proportion of Northwest addition agent No. 230, or prepared by adding directly to the water, 10 per cent to 50 per cent Northwest emulsion cleaner No. 3.

The process is adaptable to the smallest shop or the largest plant, automatic or manual handling. Parts may be kept right on the plating racks throughout the operation.



Setup for experimental trepanning operations. Coolant pump is mounted in aluminum covered housing behind lathe and moves with the work. All meters and gages mounted on housing exterior are visible from work area. Inset shows sample of work performed with resultant cores

TREPANNING LATHE...

Saves Time and Metal

REMOVAL of a solid core in alloy steel forgings at a rate in excess of that possible with conventional boring techniques opens the way to major economies both in defense and peacetime production. Experimental trepanning lathe work performed thus far by Heppenstall Co., Pittsburgh, on nickel-chrome-molybdenum steels has yielded a cutting rate of about 180 inches per hour in an 8-inch diameter, 4-foot long steel bar. A second larger trepanning lathe is being rebuilt to handle heavier and longer work.

Gun barrels and gun housings can be cored at an accelerated rate, leaving a highly finished, accurate bore through the metal. A complete metal core in place of waste chips means tonnage savings in premium metals for other useful purposes and product fabrication.

Advantages of trepanning are not confined to armament work. Peacetime items such as gear forgings, oil field drill collars and rotor forgings for turbines and generators are areas where the techniques may show important benefits. C. W. Heppenstall, vice president, who supervised the design and building of the trepanning lathe, gives as an example the four 8-hour shifts required to bore inspection holes in generator rotors and continues, "The economy that is obtained in trepanning the same job in from 1 to 2 hours is obvious."

Modifications Are Enough—Company engineers believe it should be possible to modify many American-built lathes to perform this work. Heppenstall renovated one of its own rough turning lathes into the new unit. The first lathes of this general type were designed and built in Germany but modifications were later made by Walter Somers Ltd. at its plant in Birmingham, England.

Patent applications covering engineering details incorporated in the company's modified lathe have been made in the United States, Canada and Great Britain. Some of the features are:

1. Variable voltage main drive.
2. Gearless headstock.
3. Infinitely variable hydraulic feed.
4. High pressure seal adequate for 400 psi.
5. Hardened steel wearing plates on the bedways.
6. Complete instrumentation indications of: Per cent load on main motor drive, rate of feed in inches per minute, surface feet per minute at the point of the cutting tool and/or rpm of the main spindle drive, coolant pressure in pounds per square inch and coolant temperature in degrees fahrenheit.
7. Centralized electrical control.

Tungsten carbide tip used in the trepanning lathe weighs only 8 grams. Tips used in early experiments

Pushbutton controls handle all machine functions from one location simplifying operations

were made by an English firm but Carboloy tips will be supplied to American firms using the process. Oil coolant pressure used on experimental runs was 200 psi but pressures around 400 psi will be used on trepanning 35-foot lengths. A coolant pump capable of delivering the fluid up to 500 psi has been designed by Ingersoll-Rand. It will travel along with the work keeping length of flexible hose delivering coolant to the work to a minimum.

Not a New Line—Heppenstall does not wish to go into the machine tool business but will accept orders to redesign and rebuild through subcontractors any suitable American boring lathe. No American machine tool manufacturer has yet been licensed to build the trepanning lathe or a German rough machining lathe that is still in the works.

TREPANNING LATHE PERFORMANCE

	A	B	C
Speed, rpm	700	850	900
Feed, per rev	0.007	0.008	0.010
Load before cut, hp	14	14	14
Cutting load, hp	31.5	35/42	42/49
Length trepanned, inches	45½	45½	45½
Bore dia., entrance	2.627	2.626	2.628
Bore dia., exit	2.629	2.628	2.630
Core dia.	1.127	1.126	1.126
Eccentricity	0.002	0.003	0.002
Penetration, in./hr	300	480	540
Brinell hardness	302	302	311

The accompanying table gives performance records of three experimental runs on three 8-inch outside diameter steel rounds, 48½ inches long and creating a 2⅝-inch diameter bore. Columns A and C are for Heppenstall grade 2-C-30, similar to AISI 4340 modified and column C is for the company's 9-R-40, similar to AISI 4140 modified.

Work is being performed to ready an American-built Schiess rough turning lathe for unveiling in the near future. Some advantages expected in the lathe which will use tungsten carbide tools are: High rate of metal removed, quick method of changing tools, use of three carriages relatively short in length with full control of the lathe from each carriage, simple design of contour machining, automatic removal of chips and complete instrument indication.

Electrode Produces Stable Arc

A tungsten electrode which will reduce inert-arc welding costs has been announced by the General Electric Co.'s Welding Division, Fitchburg, Mass. The major applications of the new tungsten will be for inert-arc welding with direct current, straight polarity using either argon or helium gas.

Hi-Thoria tungsten electrodes will produce a stable arc over a wider range of currents and will resist contamination by weld metal. They have strength comparable to standard pure tungsten.

End of a standard tungsten electrode when subjected to arc temperatures tends to become molten and forms a round shiny surface. The molten surface sputters off into the work in relatively large quantities on arc starting and in minute quantities from time to time when welding, so that the tungsten is slowly consumed. Hi-Thoria tungsten, however, runs cooler than standard tungsten and does not become molten. The end remains square and intact and consumption is reduced.

Steel Castings Booklet Reissued

Due to increasing volume of requests for definitive data on steel castings, prompted by defense mobilization requirements and notable advances in engineering and design applications, Steel Founders' Society of America, Cleveland, is making available additional copies of its comprehensive booklet on the steel casting industry. The 34-page illustrated booklet uses graphic case history examples to demonstrate the versatility, strength and dependability reflected in the performance of millions of steel castings proved in exacting service during the last 50 years. Emphasis is put on economies of production, together with adaptability to complex design requirements.

Titled "The Steel Casting Industry," the booklet lists seven prime reasons, aside from economy, why virtually all types of manufacturing industries are making increased use of steel castings for a great variety of finished products. Particular emphasis is directed to the steel casting industry's extensive research and product development activities covering a vast range of engineering and mechanical applications.

Thumb-Power Closes Fastener

A small inexpensive metal fastening device put on the market by American Shower Door Co., Los Angeles, is known as the Thumweld. It is designed primarily to be used as a permanent fastener where rapid assemble or disassemble is important or to replace screws or bolts securing parts that are occasionally removed for service or inspection. Possible uses are for access plates, radio parts, metal housings, panels, cable brackets, instruments, etc.

Fastener applies from one side and requires only drilling of a 3/16-inch hole. Thumb pressure is sufficient to lock it in place. Once locked the fastener grips as securely as a metal screw or bolt and will not jar loose. To release, a quick pry with a screw driver or thumb nail is sufficient. Thumweld fasteners will be available for hole sizes ranging from ⅛ to ½-inch and for metal thickness up to ½-inch.

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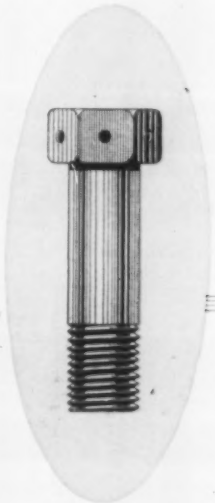

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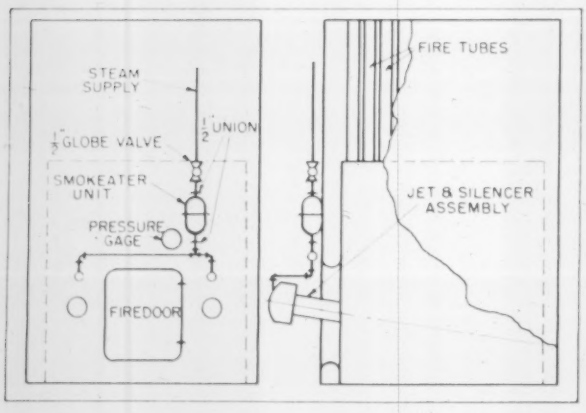
New Catalytic Process Effectively Eliminates Smoke

INDUSTRIAL smoke elimination—a subject of continual discussion and concern in every large urban area—is now receiving a "shot in the arm" by use of an ingenious catalytic system known as Smokeater produced by Economy Smokeater Inc., Amsterdam, N. Y. In addition to assuring more complete combustion, it is said to increase heat transfer efficiency and aids in keeping tubes and flues clean—indirectly cutting down maintenance expenditures.

A steam line is taken off the header and passed through a small chemical-containing cartridge attached to the boiler's exterior. Discharge end of the cartridge is connected to either a specially designed air jet or steam-air jet spray in the boiler's combustion chamber. It is claimed that from 65 to 80 per cent less steam and air is used than with a normal type steam air jet; the system uses 55 pounds of steam per hour per jet. Ordinarily two jets are used with one cartridge. This is possible by use of chemicals which create catalytic combustion in the firebox.

Chemical content of the cartridge differs from other types of chemicals as it is completely organic in nature and therefore noncorrosive and nonharmful to the boiler. Chemicals are less than 1 per cent as corrosive as normal products of coal combustion, according to testing laboratory reports. There are further evidences of its nonharmfulness in tests made from stack gases over mercury; they revealed that no additional corrosive action appeared as compared to samples taken without use of the cartridge.

Excess Nitrogen Harmful — Company engineers point out that the reason for not introducing too much air is to prevent introduction of excess nitrogen in the combustion area; nitrogen only absorbs heat and passes through the boiler as waste. Catalytic action which takes place forms a chemical chain reaction which burns the hydrocarbons in the firebox and primary boiler passes. This creates additional



Front and side view of the system installed on the vertical boiler of the crane shown in the photograph

These photos, taken 10 seconds apart, show the dense black No. 5 smoke and its elimination with the catalytic process. Ten-pound steam pressure was used on the vertical boiler of this traveling crane by one of the country's leading steel producers

temperatures which eliminate soot and fly ash on the boiler surfaces and tubes. This greatly increases the boiler's heat transfer and combustion efficiency thereby raising overall boiler efficiency. In a test at a Pittsburgh steel plant, a 12.9 net savings was revealed after the cost of steam and unaccounted for losses were taken into account.

Reduction or elimination of smoke and increased efficiency result from a catalytic effect of the chemicals in speeding up oxidation and lowering the ignition temperature of hydrocarbons from 1135 to 630° F. It has long been said that in any combustion process involving hydrocarbons there is in effect a race between hydroxylation and "cracking." If the cracking process is the faster, we have formation of carbon particles, "carboids," or smoke; but if hydroxylation (that is, gradual absorption of oxygen by the hydrocarbons to form hydroxyl compounds) prevails, then no smoke is produced.

Effective for 34 Days—Chemicals used in the cartridge are of a proprietary nature. It is not indicated what chemicals are contained in the cartridge and carried into the furnace by steam flowing through them, but observation indicates there is a catalytic effect. Confirming this effect is the definite falling off in effectiveness of the system and an increase of smoke when cartridges have been in use for more than a specific length of time. Cartridges are designed so the chemicals will hold up under a steam pressure of 45 pounds continuously for 34 days.

Tests reveal that fly ash is greatly reduced beyond any practical nuisance as almost all carbon is burned out; instead of being large and gritty it is reduced into infinitesimally small pieces of almost pure ash. Because of its lightness, this ash passes out into the air and floats for miles before settling.

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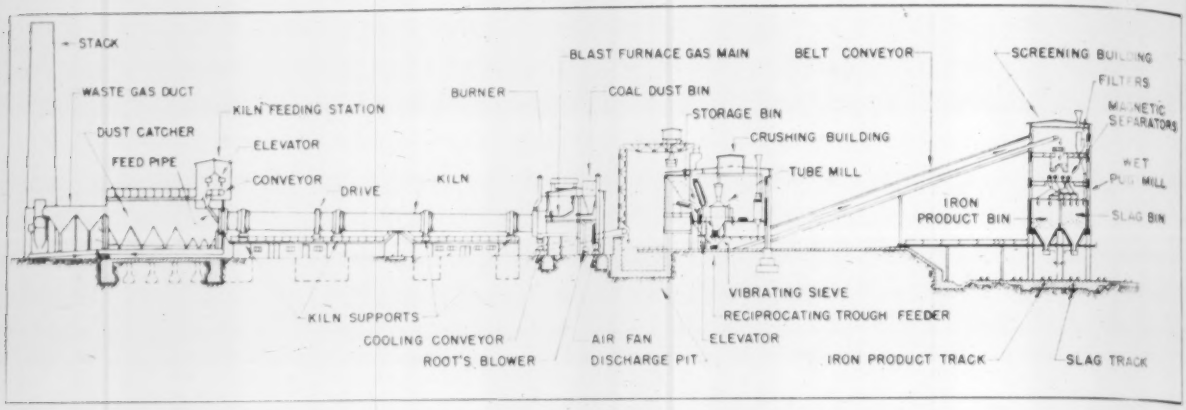


Cross-section of a typical Krupp-Renn plant in operation at Watenstedt, Germany

Krupp-Renn Process Urged For

IRON ORE BENEFICIATION

Nonmagnetic taconites can be beneficiated directly without magnetic roasting in this Czechoslovakian plant which raises the grade of iron from 28 to approximately 92-93 per cent. Product from this operation is being successfully used in European blast furnaces

By P. E. HENRY
Institut de Recherches de la Siderurgie
Paris

and C. F. RAMSEYER and J. R. MILLER
Ramseyer & Miller Inc.
New York

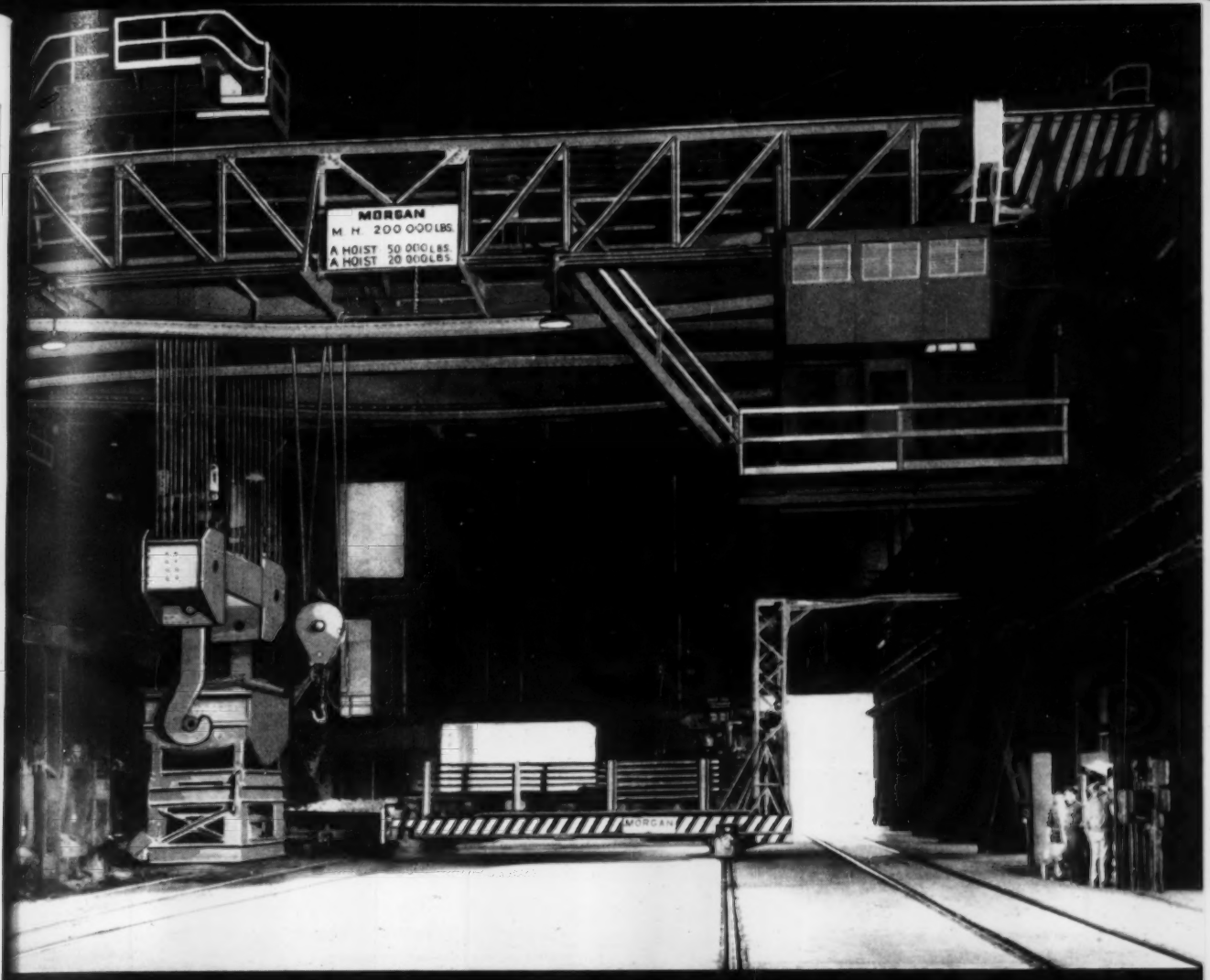
A METHOD of treating low grade siliceous iron ore under reducing conditions in a rotary kiln is known as the Krupp-Renn process. Developed by the Krupp Co. of Germany during the early nineteen thirties, the process was applied to a pilot plant at Borbeck, Germany in 1934. It was originally designed to recover a form of metallic iron directly from low grade ores that could be used in steel furnaces without further beneficiation. Experience proved that it was an ore beneficiation process, since its product was normally so high in sulphur that it could only be charged to the blast furnaces.

Tests using French ore from the Bazailles mine were run in the early months of 1949 at Czech United Steels Co. in a Krupp-Renn rotary kiln installed at their Kraluv Dvur plant not far from Prague, Czechoslovakia. The French ore analyzed approximately as follows: 34 per cent Fe, 25.4 per cent SiO, and 3.13 per cent CaO.

Results of the investigation showed the process had the following apparent advantages: Makes possible recovery of iron present in the form of silicates in the ore which cannot be recovered by any other beneficiation process; can be used to process nonmagnetic taconites directly without magnetic roasting; could increase the iron carrying capacity of our Great Lakes ore fleet since less gangue and oxygen would be moved from Minnesota to our blast furnace plants; while showing no savings in total fuel requirements, it would save blast furnace metallurgical coke ($\frac{1}{3}$ versus $\frac{3}{4}$ of a ton); and use of Krupp-Renn metal could also greatly increase present blast furnace capacity.

Resembles Blast Furnace Practice—To a certain extent the process operates on the same principle as a blast furnace, in that to obtain the desired separation of metal from the gangue the ore is first reduced and then both the iron and gangue melted. Unlike in the blast furnace, however, the metal never becomes completely molten and, in fact, it is recovered in solid rather than liquid form, dispersed as rounded granules of metallic iron in the pasty, glassy slag flowing from the kiln's hot lower end. To treat ore of this kind in a blast furnace would require a large amount of limestone to flux the silica in the gangue and the resultant high slag volume would greatly increase coke consumption as well as decrease blast furnace capacity. In the blast furnace, as normally operated, most of the sulphur in the burden and fuel is held in the slag. In Krupp-Renn practice much of it goes into the metal, and this fact is one of its main disadvantages.

Strongest point of the process is that the rotary kiln can be separately heated by the cheapest available fuel, which in Europe is usually pulverized coal. In addition to the heating fuel, a reducing agent is



Illustrated is a 100-ton, 80'-0" span, 4-girder type Ladle Crane and a 7½-ton, 26'-0" span Floor Charger.

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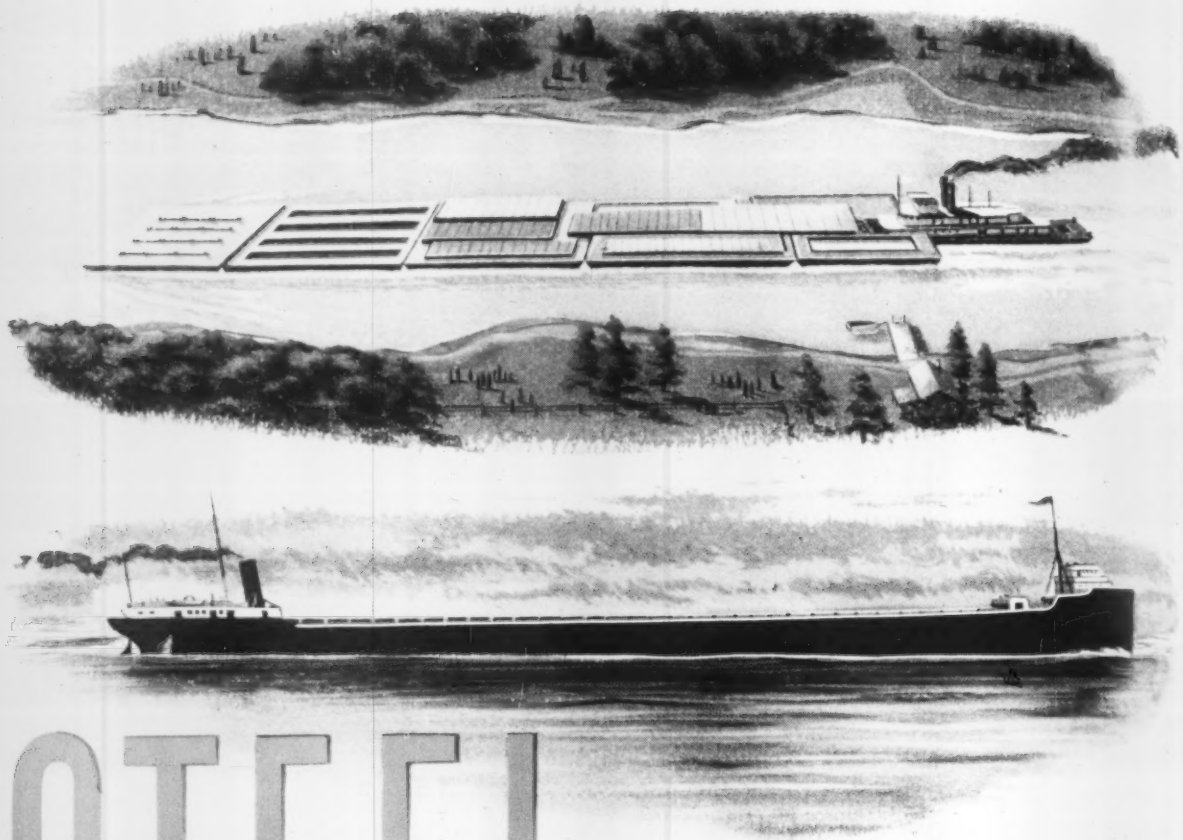

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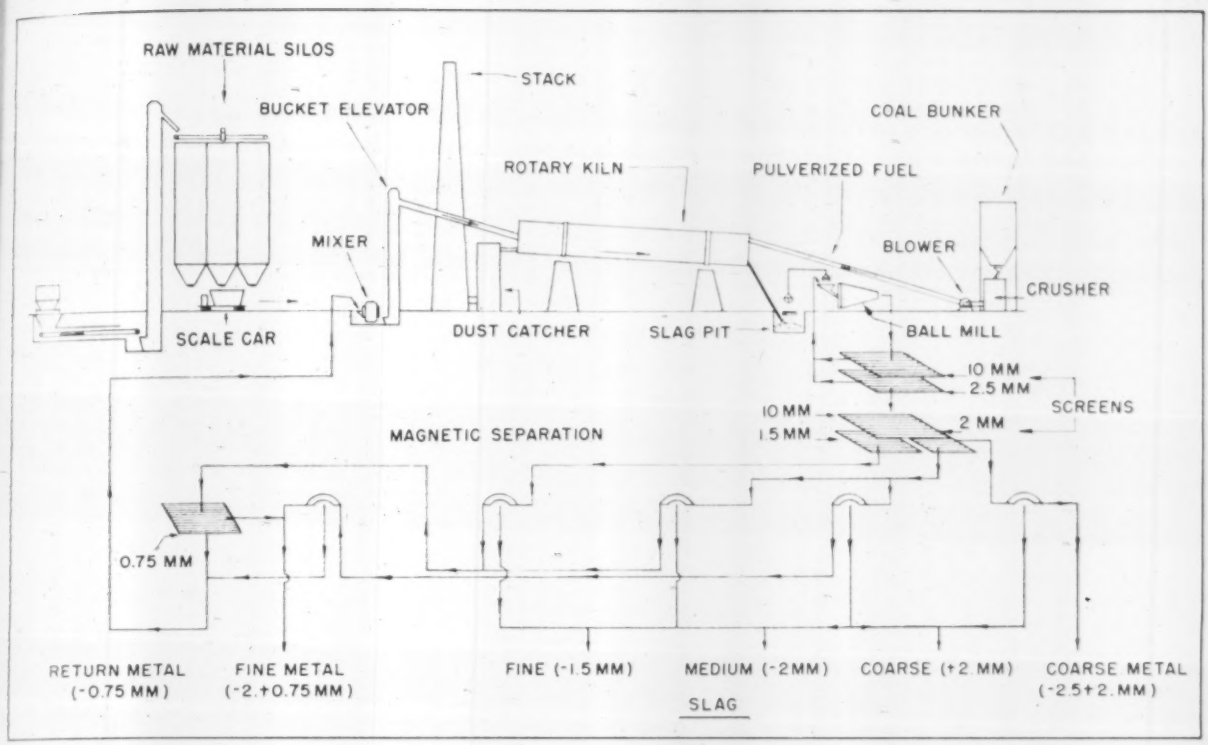
NATIONAL STEEL CORPORATION

NATIONAL STEEL



Schematic flow sheet showing the many operations involved in the process

required, but since it does not need to have the large size and high strength required of blast furnace coke, any solid carbonaceous material can be used, such as coke breeze. An excess of reducing agent is necessary to hold the loss of unreduced iron in the slag to a minimum.

Large Granules Are High-Grade—The hot, heavy viscous slag, together with its contained reduced iron granules and excess coke, is cooled with water sprays as it comes from the kiln and then crushed and sent to magnetic separators to recover the reduced iron. Larger sizes of iron granules are of relatively high grade but the smaller ones below about 25 mesh carry so much adherent slag that they are sent back through the kiln.

The kiln itself is 197 feet long with an external diameter of 11 feet 10 inches. It is mounted with a slope of 30 degrees and revolves at approximately one revolution per minute. Its lining in the upper part consists of ordinary firebrick (chamotte); a special alumino-silicate brick is used in the lower part. The latter normally becomes covered with a hard coating of sponge iron which acts as the actual lining surface.

Charge materials are kept in silos provided with bottom table feeders which discharge into a single hopper, motor-operated scale car. Discharge of material from the silos is controlled electrically by the scale car operator from the car. As soon as a charge is made up it is dumped into a vertical, conical mixing hopper equipped with central paddles. A certain amount of metallic return fines are added directly to the mixer without being weighed or analyzed. The mixed burden is raised by a bucket elevator which discharges into a pipe feeding the upper end of the kiln. A small jet of compressed air in the lower (discharge) end of the feed pipe prevents the escape of any kiln gas up the pipe.

Gas is under a slight pressure at this point due to its high temperature and the fact that the kiln is forced-draft fired from its lower end with pulverized fuel.

Burden Composition—Normal burden consists of a mixture of low grade local Czech ores—Krusna Hora and Zdice—flue dust from the two Kraluv Dvur blast furnaces (of 220 and 240 tons daily capacity), and coke breeze. The ores are oolitic, of Silurian age, and very lean. They are high in silica and low in lime.

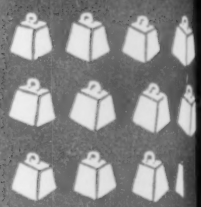
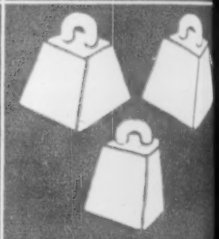
Analyses of the normal burden materials and of the slag and metal produced under normal Czech operation are given in the table on p. 98.

A lime-silica (CaO/SiO_2) ratio of approximately 0.09 must be maintained. This sometimes drops to 0.07, but the operators, never having had to go lower, do not know whether or not a still lower figure would cause trouble. The ratio can go up to 0.12, but this increases fuel consumption as the slag has to be hotter. Normal operation is possible up to 0.16; anything higher causes the kiln to ring-up about 66 feet up from the burner end where slag formation first begins.

Viscosity, or rather fluidity, of the complex glass, full of inclusions, which constitutes the product of the kiln, plays a very important role in the process, but it has never been studied systematically. Furnacemen have been content with their own empirical opinions formed from past practice. The optimum

Examples of Savings of Metals, Lab

DIE CASTINGS

PART	WEIGHT AND METAL IN DIE CASTING	SAVING OF METAL OVER OTHER METHODS
ALUMINUM BOOSTER CUP		
ALUMINUM FUZE HEAD		
ALUMINUM FUZE BODY		
BRASS BOOSTER CASING		

In the present emergency, Doehler-Jarvis is ready with 100 per cent increase in capacity since World War II, with seven plants located strategically in the following cities:

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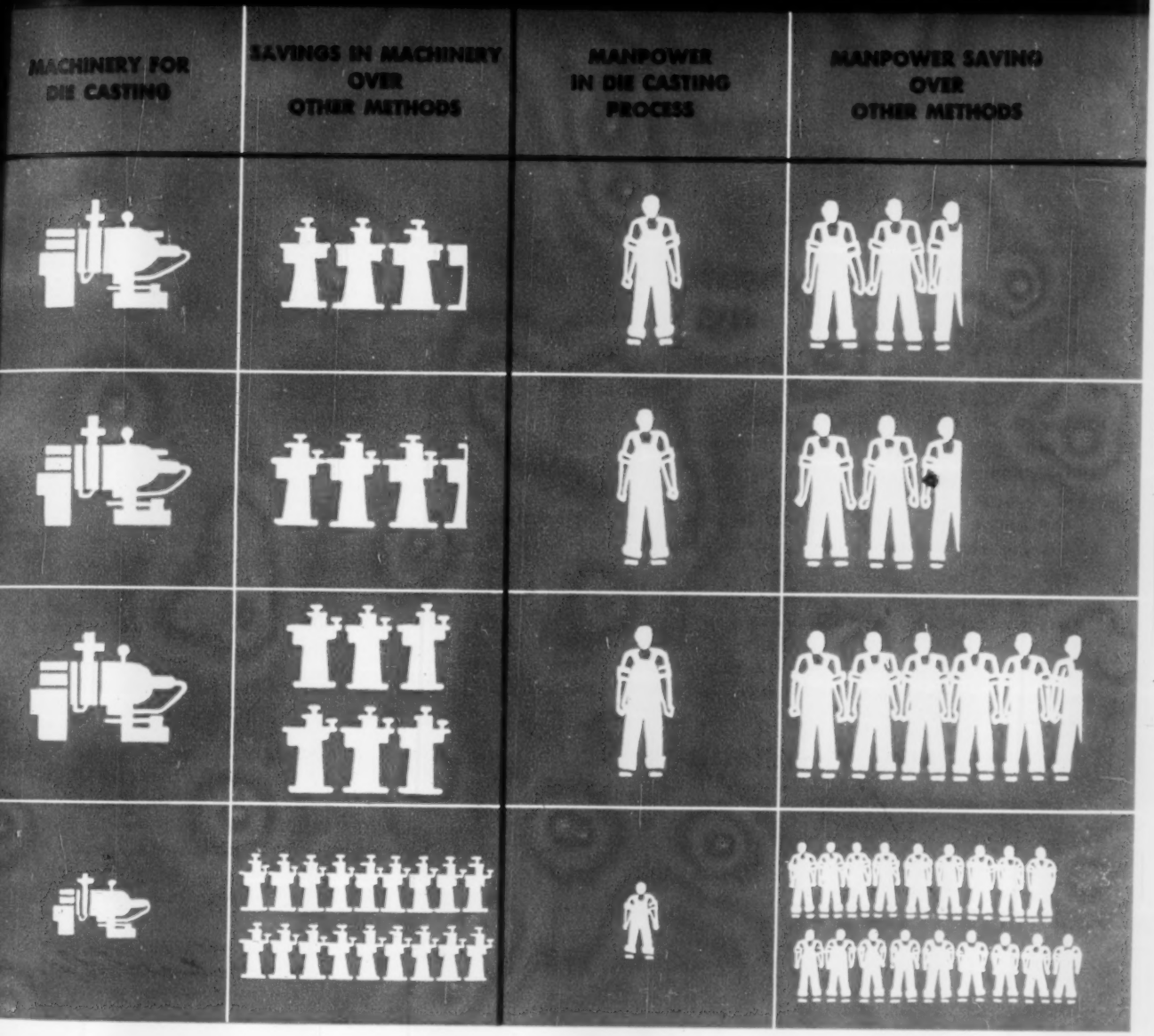
Doehler-J

...als, Machines and Manpower by Using

...S in Armament Production


MACHINERY FOR DIE CASTING
SAVINGS IN MACHINERY OVER OTHER METHODS
MANPOWER IN DIE CASTING PROCESS
MANPOWER SAVING OVER OTHER METHODS

The World's Largest Producer and Finisher of Die Castings

Jarvis

CORPORATION

Executive Offices, New York

DOEHLER-JARVIS

slag composition for smooth operation has already been given in the table.

Average fuel consumption is 560-580 pounds of pulverized coal and 1800-1900 pounds of coke breeze, both per net ton of product. Coal and coke breeze are 8-10 per cent and 25-27 per cent of the ore weight respectively.

The quality of both the coal and breeze varies. Coal available for pulverizing is often very poor; up to 36 per cent ash and 9 per cent water. The coke breeze also has up to 19 per cent ash and 18 per cent water. Thirty per cent ash and 7 per cent water for the coal and 14 per cent ash and 14 per cent water for the breeze can be used as averages. Czech coal that was fired during the French ore tests was somewhat better than normal.

Slag Reclaimed from Pit — Slag coming from the furnace is thick and viscous containing inclusions of metallic iron and bits of unburnt coke. The presence of an excess of coke is essential. The slag flows out the lower end of the kiln onto a steel pan conveyor which carries it to a pit where it is sprayed with water. It is reclaimed from the pit by a clam shell bucket.

In normal practice on local ores temperature of the slag leaving the furnace is 2330 to 2370° F. Four pyrometers installed in the kiln lining; one at 66 feet, another 148 feet up from the lower end, plus one at the upper end, and one at the base of the stack. These give temperatures of approximately 1110, 840, 660, and 480° F respectively.

A large dust settling chamber is located between the upper end of the kiln and the stack. Flue gas leaving the furnace contains from 18½ to 20 per cent of CO_2.

The crude, glassy slag is ball milled prior to magnetic separation. A single conical-type ball mill is used, mounted in closed circuit with screens so that the mill receives only plus 0.4-inch material. The mill's discharge opening contains a bar screen which

COMPOSITION OF ORES AND PRODUCTS
Dry Basis

	Krusna Hora Crude	Roasted Zdice	Slag	Metal
	%	%	%	%
Fe	30.0	26.0	...	
P	0.5	1.0	...	1.4-1.6
Mn	0.1	0.1	...	0.1
SiO_2	25-26.0	24.0	60.0	
Al_2O	10.0	10.0	20-25	
CaO	2.0	2.4	6-7.0	
MgO	1.5	1.6	5-6.0	
S	0.3	0.5	...	0.5-1.0
C	..	..	...	0.5-1.0
Si	..	..	...	0.1

While the above Czech ore analyses are not strictly exact they are believed to be approximately correct.

holds back all reduced iron balls larger than 2 inches in diameter. These act as grinding balls and are recovered from time to time when the mill is emptied to remove worn out balls. Following the ball mill there are four screens having 8, 9, 10 and 24-mesh openings for feeding five drum-type magnetic separators. The magnetic separators themselves functioned unsatisfactorily. They were poorly fed, the feed covering only a fraction of the drum surface, and the layer on even this fraction is far too thick. Among items of interest that appeared to be quite effective however were two new "natural resonance" type vibrating screens which operate smoothly. They are spring-suspended units and adjusted so that their natural period of vibration under load corresponds with that imparted to them by their vibrating unit.

Recovery of Metallic Concentrate — Nonmagnetic slag tailings are recombined arbitrarily into three commercial sizes of crushed slag, roughly plus 9 mesh, minus 9 mesh, and a mixture of the two. Similarly the metallic concentrate is recovered in three classifications approximately minus 24, 24 to 9, and plus 9-mesh. This separation can only be made discontinuously as follows: The circulating load is allowed to build up for a time in the ball mill circuit which it has to tendency to do, because the iron granules are not ground.

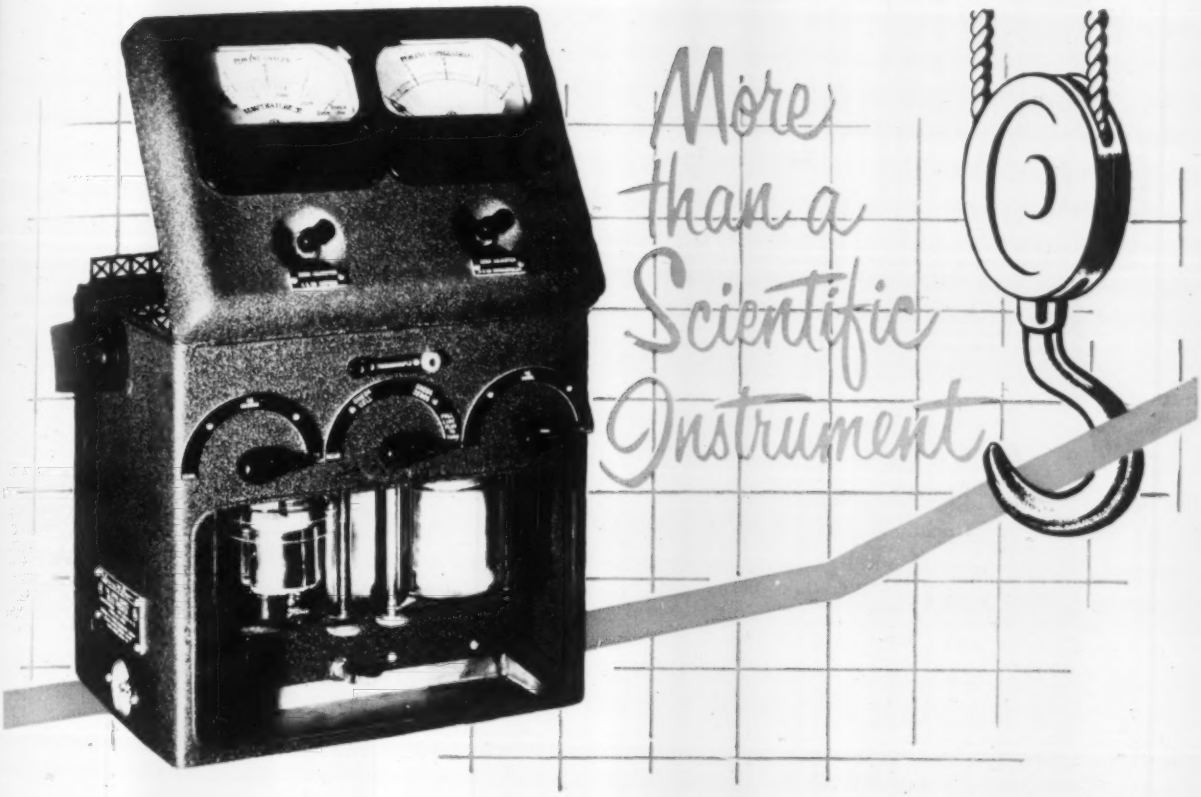
When load gets too high, the system is relieved of its excess iron by "simplifying" the circuit; i. e. by straight through rather than closed circuit operation. By this crude makeshift a mixture of various sized products is obtained. Transition from full-closed circuit operation to the simplified one is based on the foreman's judgment and experience, guided by the load on the bucket elevator motor, which increases as the loaded buckets' weight rises with increased percentage of metal.

The fine minus 24 mesh metallic concentrates are very impure, containing only 70 to 75 per cent iron. Normally they are fed back to the mixing hopper without being weighed, but during the French ore tests they were kept separate.

Products made embrace three commercial grades or sizes of crushed slag, plus an iron concentrate made up of granules of all sizes. The slag is used in concrete and for sanding snowy roads in winter. Iron granules range from 24 mesh up to balls as large as 2 to 4 inches in diameter. Their average percentage composition under normal Czech practice is: C-0.5 to 0.8, Si-0.1, Mn-0.1, P-1.4 to 1.6, and S-0.5 to 1.0.

Door Gasket Is Vinyl Plastic

DOOR SEALS on new Westinghouse refrigerators have been switched from natural rubber to B. F. Goodrich's extruded vinyl plastic Geon. Section is balloon-and-tail shape, the tail fitting into a lip of the steel inner door panel. The plastic will not crack under normal conditions, is unaffected by solvents or greases, and shows little deterioration after many years of service



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METAL PARTS *Corrosion-Proofed in Vapor Envelopes*

COST of applying and later of removing heavy rust-preventive coatings, sludging and oil spray on metal parts is eliminated by a packaging method which envelopes parts with a volatile corrosion inhibitor. Applied as a coating to kraft papers, the new chemical VPI (vapor phase inhibitor) slowly vaporizes, permeating the air surrounding metal surfaces and forming an invisible protective film. This film prevents corrosion of parts wrapped in the VPI paper or arrests rust if oxidation has started.

The treated paper, both inner and outer wrap, is manufactured by Angier Corp., Framingham, Mass. under license by Shell Development Corp.

Stable Compound—Base chemical compound used in coating this industrial protective wrapping is dicyclohexylammonium nitrite, a highly stable compound compared with other ammonium nitrites. A white solid melting with decomposition at 200-201 C and having a vapor pressure at 75 F of 0.00016 mm Hg, the compound undergoes substantially no decomposition during storage in dry air and may even be kept for long periods in warm humid atmospheres without serious loss. A military specification, based on satisfactory employment of this vapor phase inhibitor, is being compiled.

This paper wrap does not need to be in direct contact with metal surfaces to prevent corrosion; it is effective even at 1 foot or more. Careful conformity to shape is not necessary and tight sealing of the package or puncture-proof wrappings are not required. Steel or parts can be removed, examined and replaced without destroying the protective package. Many packaging procedures currently used may be readily adapted to the wrap.

The paper is effective in reducing corrosion resulting from fingerprints left on steel surfaces, but use of special solvents for removal are recommended before packaging. Protection against rust is also assured for in-process handling and storage of steel stock and temporary parts.

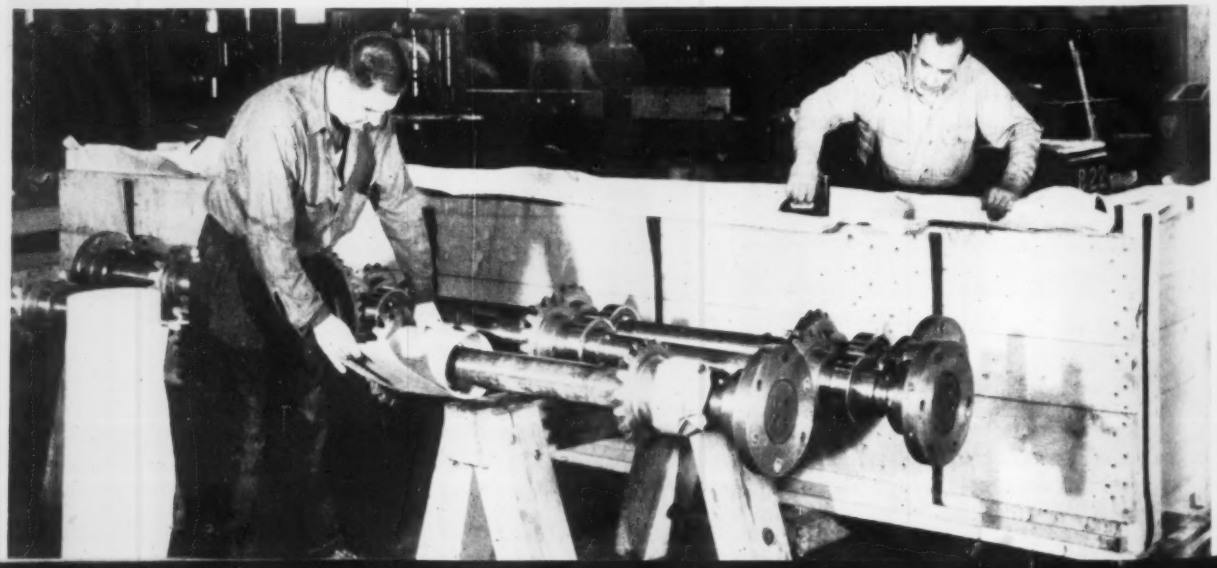
The coated surface, always on the inside of the package, should be as close as practicable to steel or metal, preferably within 1 foot. Thus, entering air passes through and over the chemically-treated paper surface before contacting metal surfaces. Enveloping parts or placing them in a VPI-lined box is often satisfactory. Plain paper or other wrapping material should not be placed between the coated surface and the steel. Any wood support or bracing should be faced with the paper. Once an article is removed from a package, protection ceases.

For long-term protection, escape of chemical vapor must be retarded by using a coated barrier wrap, flat or creped, or an outside carton. The package should be closed, but need not be sealed except for exceptional long storage. If directly exposed to rain, a water-shedding wrap should be used or the water-soluble chemical may be washed out. Creped papers are more satisfactory for wrapping irregular shapes.

With bearings, files, knives, piston rings and other small products as examples, a number of steel articles are often shipped in one carton with paper or separators used to prevent mechanical damage. Here oil coating may be eliminated, inner-wrap VPI paper or separators replacing the paper; otherwise packaging procedure remains unchanged. Adoption of this method of packaging usually entails only minor changes from present packing.

As an inner wrap a coated paper insert which does not envelop the steel is satisfactory when tightly sealed envelopes or bags made of good water-vapor barrier material are used; such an outer barrier reduces the vapor requirement. With a barrier wrap

By eliminating slushing, United Engineering & Foundry Co. saves packaging time by wrapping these rolling mill shafts in VPI paper at critical points. Placed in the VPI-lined crate the shafts will be surrounded by a protective vapor which will prevent corrosion during shipment overseas. United's foreign customers will be spared costly cleaning time



flat or creped, protection is assured for 24-60 months; prefabricated bags or envelopes of this type with suitable closure are available. With special barriers and sealed packages, protection for over 10 years is indicated. Asphalt is a good barrier material and when paper has a barrier of this type incorporated into its structure, gummed paper tapes or cellulose tapes may be used as closures; also packages may be folded and stapled.

For special packaging, combinations of inner and outer wraps are utilized or each may be used separately, depending on protection required. Wire coils, bearing races and other objects with central hollow space are spiral-wrapped with barrier or inner wrap crepe, or the entire package may be overwrapped in some cases.

Tubular products with critical inner surfaces, cylinder liners or gun barrels as examples, are protected by placing VPI coated inner wrap along entire length inside; open ends are covered, preferably with a barrier wrap to contain vapor within the cylinder. Hollow objects can be their own containers. For instance, reduction gear trains in their own housing are lined or stuffed with Angier No. 310 paper, an inner wrap, with large apertures closed with tape.

In addition to protecting steel and aluminum against corrosion, VPI-coated kraft paper is also generally satisfactory for steel parts in which nonferrous components are present. Where bare magnesium is present under severe high humidity and temperature conditions, the chemical can react with magnesium to a noticeable degree; also under severe conditions it may have a slight adverse effect on cadmium and zinc. Acidic conditions in packaging must be avoided as the vapor phase inhibitor can be decomposed by acids. Likelihood of encountering very strong alkaline conditions in metal packaging is somewhat remote, nevertheless strong alkali, above pH of 10, can also decompose the inhibitor.

The vapor phase inhibitor can also be decomposed to a noticeable degree at sustained temperatures much above 150° F and at 225° F VPI decomposes rapidly, being converted to harmless, weak nonprotective products in a short time. Such adverse conditions are rare.

Chromium Stainless Discussed

Current restrictions on the use of nickel in steel have forced engineers associated with the design, fabrication and application of equipment using vital chrome-nickel stainless steels to seriously investigate the use of straight chromium stainless grades. To assist in solving the problem, the Babcock & Wilcox Tube Co., Beaver Falls, Pa., has published a new four-page bulletin outlining the physical and mechanical characteristics of three nonhardening straight chromium stainless tubing steels.

Bulletin TDC 140 discusses B & W Croloy 12 Al (AISI type 405), B & W Croloy 18 (AISI type 430) and B & W Croloy 27 (AISI type 446). Included are technical data on analyses, creep strength, properties at room and elevated temperatures, corrosion and oxidation resistance, forging, forming, machining, welding and heat treatment.

Scrap Reduced on Foil Mills

Scrap losses and machine downtime due to foil breakage on aluminum foil mills are pared sharply with a precision tensioning control on mills built by Lewis Foundry & Machine Co., division of Blaw-Knox Co., Pittsburgh. The control is based on use of a high capacity, low pressure air brake made by Linderman Devices, Newburgh, N. Y. Tension produced by this brake, indicated by arrow in illustration, can be precisely calibrated against air pressure and controlled by an air valve. Ordinary factory line compressed air is adequate.

Changing tension requirements as the coil is dereeled is taken care of by the operator who adjusts air pressure to the brake according to a calibration

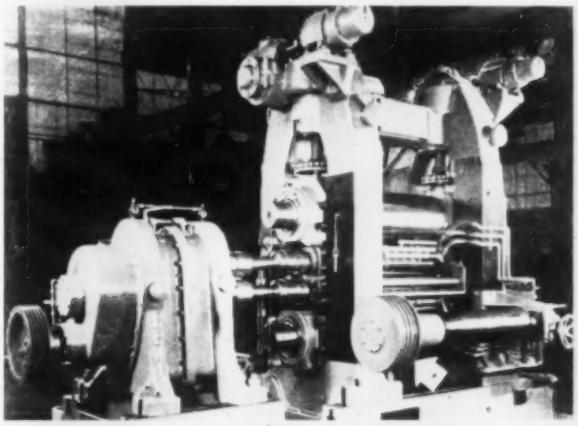


chart. Precise control is possible because the brake is free from any self-energizing action. Braking power is directly proportional to the applied air pressure and possible variations in braking effort are not multiplied by the brake.

Four floating and self-aligning shoes operated by multiple diaphragms give over 90 per cent area contact with the drum. Diaphragms under each shoe are interconnected and superimposed so that shoe movement is equal to several times the diaphragm expansion. Diaphragms under each shoe are interconnected to balance shoe pressure. Low unit pressures can give large braking pressure, less than 10 pounds air pressure is used most of the time. Low pressures evenly distributed on shoes and drum mean slight wear on the lining. Shoes are adjustable but such adjustment is required infrequently as normal wear is taken care of by diaphragm expansion.

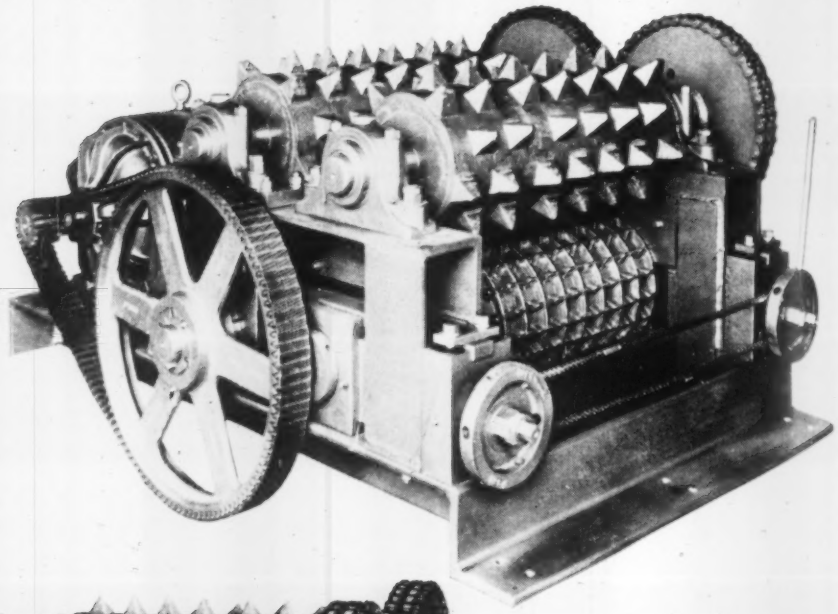
"Adds" Storage Space

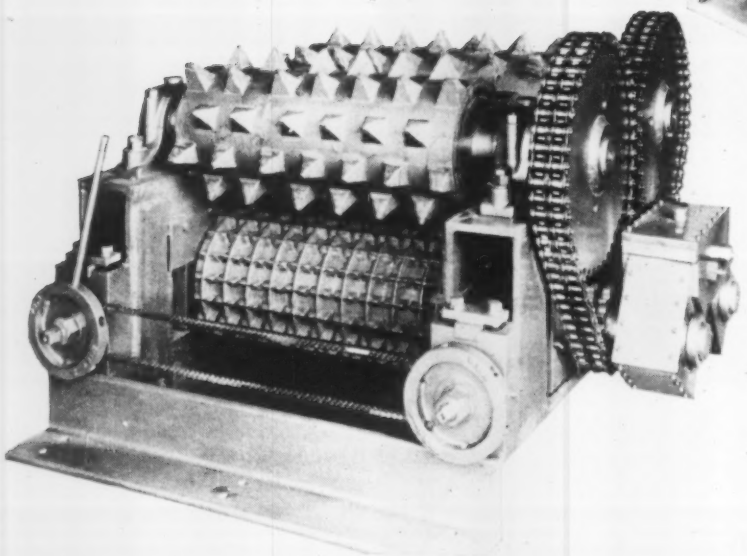
A design innovation that permits standard 83-inch over-all height telescopic lift trucks to tier loads in greater than 16-foot stacks was announced recently by the Philadelphia Division of Yale & Towne Mfg. Co. This new development will enable industrial concerns to utilize available storage space now considered critical both from a cost and availability standpoint.

The new device consists of an extra set of front channels and an additional lifting cylinder. The channels are hung directly in front of the regular telescopic channels and are operated by a separate control. This extra attachment can be quickly removed.

Powerful MORSE C

Morse Silent Chain Drives maintain absolutely constant speed ratio. They are unaffected by atmospheric conditions or idleness. Morse Silent Chain Drives need but few adjustments to maintain tension, save valuable servicing and replacement time. The exclusive Morse Rocker Joint gives Morse Silent Chain Drives highest operating efficiency and longest possible life by substituting rolling for sliding action.





Precision-made Morse Roller Chain Drives use teeth, not tension. And that means positive power transmission. There is no slippage. Friction loss is slight, constant ratios are maintained. Morse Roller Chain Drives save space, operate equally well on short or long centers. They give extra-long, trouble-free life.

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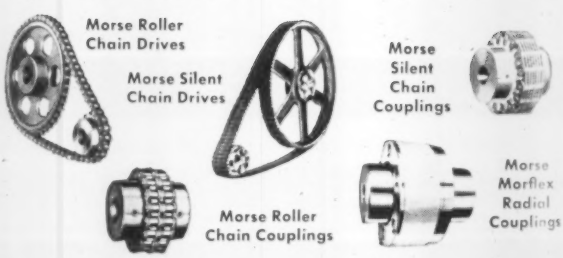
From coast to coast there are more than 100 offices, representatives and distributors of Morse Power Transmission products to give you quick information and service when you want it—where you want it. *Ask the Morse Man first in any case!* Check your classified phone directory under **"Power Transmission"** or **"Chains"** for the nearest Morse Man.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MORSE
MECHANICAL
POWER TRANSMISSION
PRODUCTS

PRODUCTS OF B-W BORG-WARNER

Getting Most Out of Machines

(Continued from Page 83)

not been used more extensively in this field.

Increased Production, Reduced Costs: An Example

The Problem—What is the fastest and cheapest way to machine a pinion forging into a semifinished piece, ready for gear cutting, splining, threading and final grinding? Ford Motor Co. and a machine tool builder together developed a special automatic lathe for the job. The Ford hypoid pinion had been turned on conventional prewar design lathes equipped with high-speed steel tools which, in terms of postwar machining and machine tools, were underpowered, obsolete and no longer economical to operate.

Before acceptance and installation into production, this lathe was comprehensively tested on the builder's floor using various tools, feeds and speeds, and forgings of different compositions, heat treatments and microstructures. Actual testing was divided into three phases: The machine itself, selection of the best tool material for tool life and finish accuracy, and economical selection and control of the most machinable microstructure.

The Machine—Production expectations were fulfilled; the machine, on the whole, was satisfactory. (One lathe now does the work of five machines it has replaced, at great savings in floor space, total power, material handling and all fixed costs.) Because of the high speeds and spindle power (1005 rpm and 50 hp) machine evaluation tests were made to uncover possible sources of future trouble. For optimum surface finish, tool life and general machine service life, the maximum rigidity and freedom from vibration must be maintained. So, partly in anticipation of even higher speeds and power, heavier spindle bearings, closer dynamic balancing and higher-quality gear finishing were recommended.

Cycle time (floor to floor) is about two and a half times the actual machining time (21 seconds against 8 seconds), but further reduction of unloading and reloading time was considered impracticable, especially on a single spindle machine. Chucking and dogging in the usual sense have already been eliminated. The previously center drilled new piece is laid on a cradle as the finished piece is removed. The hydraulic tailstock presses the piece into five knife edges on the face plate (somewhat like a wood lathe live center) after the cradle retracts. The headstock center is spring loaded for location of the piece prior to imbedding the drivers. Tailstock pressure automatically drops after imbedding, to a safe holding pressure. The coolant hood is automatically retracted and reclosed during the loading operation.

Two slides with simultaneous, independent feeds were provided to perform all turning, facing and chamfering operations at one time. Six tools operate on the front slide; four on the rear. The thread diameter which requires the most metal removal, is cut by two tools to equalize tool wear, minimize time and provide better finish. The other diameters, turned by one tool each, are of approximately equal length which equalizes the cutting times.

The Tools—Tool life, dimensional accuracy, and quality of finish require simultaneous consideration. The tool life end point depends not only on economical regrinding but also on how much wear is tolerable before dimension limits are exceeded.

Various grades of carbide were tried, and Kennametal K3H or its equivalent proved superior to the others. This does not preclude possibility of a still better material however. Optimum feed proved to be slightly under 0.015-inch per revolution. Higher feed rates overloaded the machine and caused tapering due to deflection of the piece, in addition to excessive tool wear.

Tool number 6, which turns the gear face and operates at an average speed of 825 fpm, shows 0.030-inch wear at 350 pieces. The others, at the same tme, all show under 0.010-inch wear, and their speeds are all less than 400 fpm.

At optimum feed, with best tools and controlled part microstructure, total average power demand was 18 hp. While cutting loads momentarily exceed 50 hp (the motor rating), they are well under the stalling torque and the motor size is adequate.

The power graph from the recording wattmeter, in addition to showing peak loads, compares the cutting process from cycle to cycle. It enables a supervisor to oversee production at a glance, noticing whether or not cycle time is constant and observing the rate of power increase with tool dulling. Unusual power

CALENDAR of MEETINGS

† *Denotes first listing in this column.*

Mar. 12-14, American Roadbuilders Association: Annual meeting and national defense conference, Hotel Schroeder, Milwaukee. Association address: 1319 F St., Washington 4.

Mar. 12-15, National Electrical Manufacturers Association: Meeting, Edgewater Beach Hotel, Chicago. Association address: 155 E. 44th St., New York 17.

Mar. 13-16, National Association of Corrosion Engineers: Conference and exhibition, Statler Hotel, New York. Conference committee address: P. O. Box 6120, Philadelphia 15.

Mar. 14-17, American Society of Tool Engineers: Annual meeting, Hotel New Yorker, New York. Society address: 10700 Puritan Ave., Detroit 21.

Mar. 15-17, American Society of Training Directors: Annual conference, Bellevue Stratford Hotel, Philadelphia. Convention address: Allegheny & 19th Sts., Philadelphia 32.

Mar. 19-20, Liquefied Petroleum Gas Association Inc.: Convention and trade show; directors' meeting, Biltmore Hotel, Atlanta. Association address: 11 S. La Salle St., Chicago 3.

Mar. 19-21, National Association of Waste Material Dealers: Annual meeting, Stevens Hotel, Chicago. Association address: 1109 Times Bldg., New York.

Mar. 19-21, Steel Founders' Society of America: Annual meeting, Edgewater Beach Hotel, Chicago. Society address: 920 Midland Bldg., Cleveland 15.

Mar. 19-23, American Society for Metals: Seventh western metal exposition and congress, auditorium and exposition hall, Oakland, Calif. Exposition address: 215 S. Clark Dr., Beverly Hills, Calif.

Mar. 21-22, American Hot Dip Galvanizers Association Inc.: Annual meeting, Hotel Biltmore, Atlanta. Association address: 2311 First National Bank Bldg., Pittsburgh 22.

Mar. 22-23, Pressed Metal Institute: Spring meeting and technical session, Hotel Carter, Cleveland. Institute address: 13210 Shaker Square, Cleveland 20.

†Mar. 28-29, Instrument Society of America: Iron and steel instrumentation conference, Carnegie institute of Technology, co-sponsor, Roosevelt Hotel, Pittsburgh. Society address: 921 Ridge Ave., Pittsburgh.

Apr. 2-3, Diamond Core Drill Mfrs. Association: Annual meeting, The Homestead, Hot Springs, Va. Association address: 122 E. 42nd St., New York.

Apr. 2-4, American Institute of Mining and Metallurgical Engineers: Open hearth and blast furnace, coke oven and raw materials conference, Statler Hotel, Cleveland. Institute address: 29 W. 39th St., New York.

†Apr. 2-5, Boston and Apr. 9-12, Cleveland, American Chemical Society: Annual meeting. Society address: 1155 16th St., Washington 6.

†Apr. 5, National Metal Trades Association: Annual meeting, New England Congress, Sheraton-Biltmore Hotel, Providence, R. I.

Apr. 8-12, American Hardware Manufacturers Association: Spring convention, Biltmore Hotel, Palm Beach, Fla. Association address: 342 Madison Ave., New York 17.

Apr. 10-11, Westinghouse Machine Tool Electrification Forum: Westinghouse Electric Corp., sponsor, William Penn Hotel, Pittsburgh. Forum address: 306 Fourth Ave., Pittsburgh 30.

Apr. 10-11, Society of Automotive Engineers: Annual earthmoving industry conference, Peoria, Ill. Society address: 29 W. 39th St., New York.

†Apr. 16-18, American Society of Lubrication Engineers: Annual convention and show, Bellevue Stratford Hotel, Philadelphia. Society address: 343 S. Dearborn St., Chicago 4.

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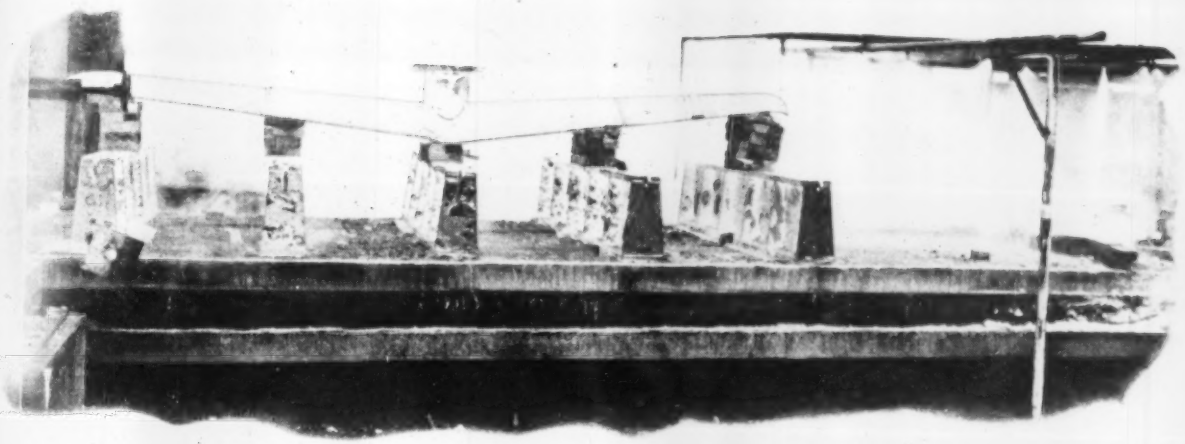

MISSOURI may be the "Show Me" state. But even after they're shown, some Missourians are still amazed by the way this Lumnite car top absorbs thermal shock at Nooter Corp., St Louis.

From a fiery 2000° F. to 2300° F. annealing furnace, Nooter's big car is rolled under a quenching bath of cold water. A terrific thermal shock! Yet the car top is in excellent condition after seven months service. It may last for years. Some Lumnite car tops have stayed in service several years!

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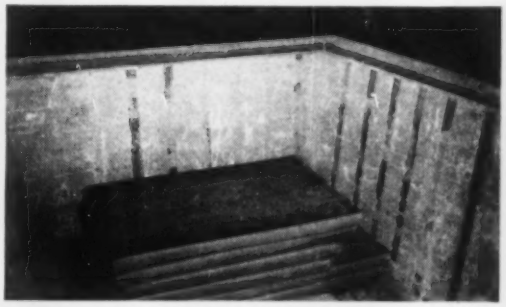

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increases, as shown on the graph, may indicate some machine failure not immediately apparent to the operator, and can forestall serious damage. Interruptions to production, also shown on the graph, would require explanations.

The Microstructure—No significant differences in machinability were found between the two steels tested (SAE 8620 and SAE 4028). Tool life increased considerably when salt-bath annealing was used in preference to production normalizing. Hot-rolled bar stock is induction heated to 2200°F at one end for the upsetting (forging) operation. The other end remains cool. After forging, the following alternatives were investigated:

1. *Production normalize.* Heat entire piece to 1775° F for 1½ hours to attain temperature, 2 hours at temperature to assure complete transformation into austenite and to promote grain growth. (This assumes parts had been random-cooled after forging and subsequently reheated.) Furnace cool to 900°F in 4 hours for slow transformation; then air cool. Structure is about 75 per cent ferrite and 25 per cent pearlite, uniform grain size throughout, with some banding. This holds for both 8620 and 4028 steels.

2. *Salt-bath anneal.* From the upsetter immerse immediately into 1190° F salt bath for 45 minutes, water dip, then air cool. This causes isothermal transformation at minimum time and assures uniform cooling throughout (STEEL, July 10, p. 84). Microstructure is the same as in normalizing but slightly coarser due to its higher temperature of formation. This process not only improves tool life but also it eliminates much unnecessary rehandling and furnace cost.

Overall Gains—Production is now obtained on this one lathe equal to that formerly obtained in two operations with seven conventional machines, tooled with high-speed steel and operating 300 rpm. Heat treatment has been reduced from 7½ hours to 45 minutes, and two complete operations have been eliminated. Surface finish has been improved from 570 microinches (half a thousandth) rms to 250 microinches or less at the slowest cutting speeds and from 340 to 90 microinches at the highest speeds on the two machines.

The higher speeds reduce built-up edge tendency, and greatly reduce work hardening at the work surface, which impairs the subse-

quent finishing operations.

Selection of Sintered Carbide Cutting Tools

Sintered carbide metalcutting tools have brought about a revolution in industrial production. Their extreme hardness and high strength, which are maintained at high temperatures, permit production rates in the vicinity of four times as high as are possible with other tool materials. The widespread adoption of carbide has not been a sudden step for many reasons. First, machine tools require considerable redesign, incorporating much higher speed ranges, more inherent strength and much more power to utilize carbide tooling effectively. Secondly, the carbides themselves have improved steadily during the past 15 years, and individual grades have been perfected to suit a far greater range of machining applications than possible at first. Thirdly, the totally different nature of the carbide materials has required a new technology of the cutting process and of the proper application of carbides.

Many to Choose—At present there are several sources for carbide tool materials, and each company offers from six to twelve grades or classes from which to choose. Their literature offers selection charts and tables, explaining the individual properties of the various grades and how they are best used. A user could easily infer that carbides from different manufacturers designed for a specific application should be equivalent, but this is not entirely true. Carbides are produced by powder metallurgy. Not only can composition vary widely, but grain size, sintering temperature and production controls can lead to infinite combinations of physical properties. "Equivalent" grades may provide identical results under one set of machining conditions, but quite different under slightly different conditions. High tool life and good surface finish with one carbide on a few jobs is likely to suggest its adoption as a universal standard to simplify inventory problems.

Carbides differ so widely from smelted, cast, forged, wrought and rolled metals that a few fundamental comparisons will be valuable. Rockwell C hardness of carbides ranges from 75 to 82; the maximum value for 18-4-1 high-speed steel is 66. Young's modulus of elasticity for carbides is from 50 to 95 million; for steel, 32.5 million. Carbides have relatively low tensile strength, and they fracture under shock loads. Car-

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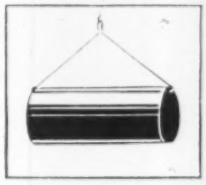
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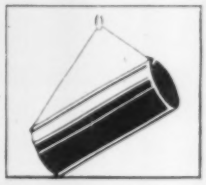
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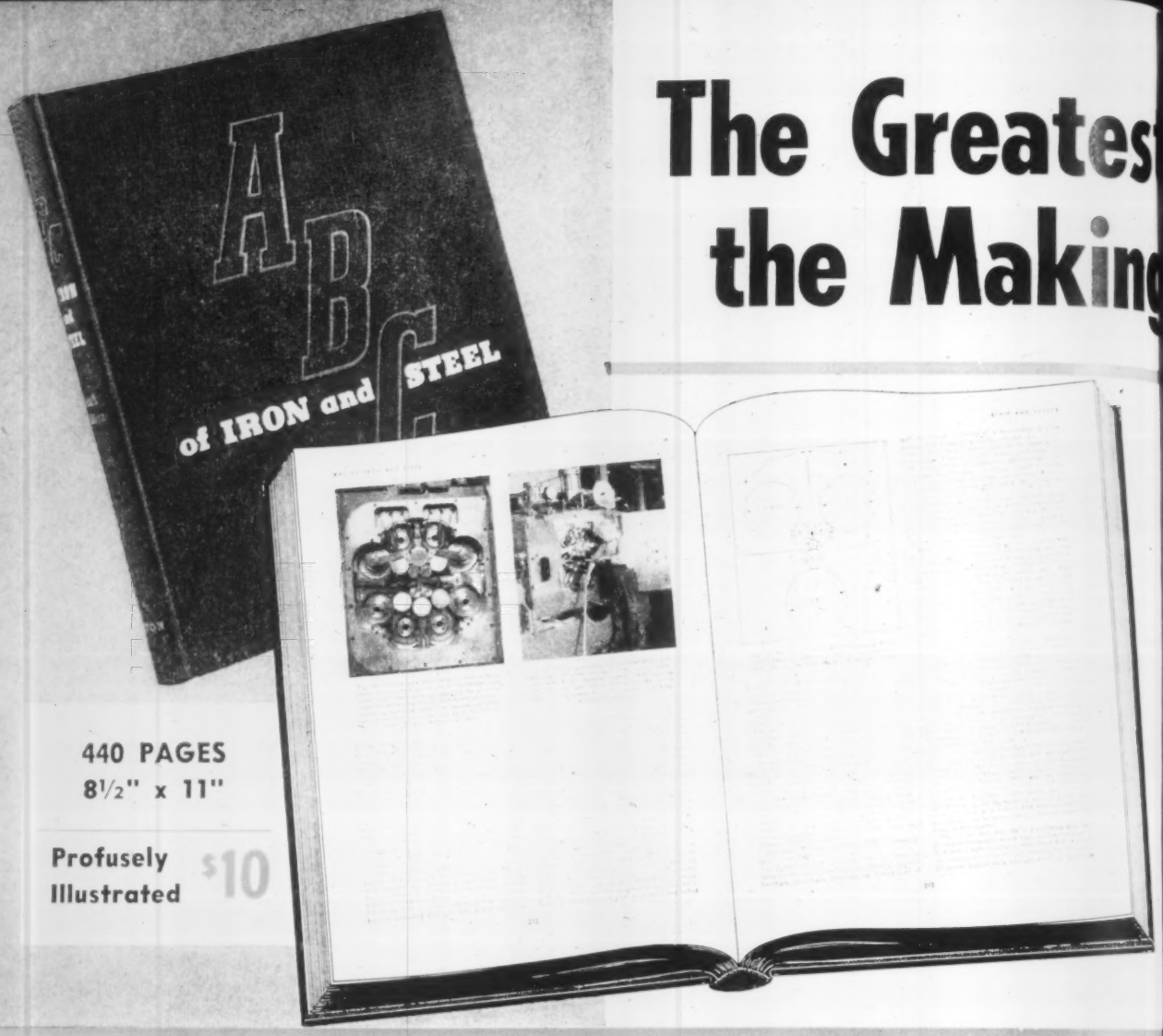

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New AISI Steels Conserve Mn, Ni, Cr and Mo

CHEMICAL compositions of the new boron-containing steels (STEEL Feb. 19, p. 38, Mar. 5, p. 57) developed to conserve manganese, nickel, chromium and molybdenum were recently announced by the American Iron & Steel Institute. The 80Bxx series is designed to have hardenability equivalent to the 86xx steels at the same carbon content. Hardenability of the 81Bxx series will be equivalent to the 41xx steels; 94B17 to 4820—of the same carbon content.

Ranges and limits shown in Table I apply to steel not exceeding 200 square inches in cross sectional area 18 inches in width or 10,000 pounds in weight per piece.

These steels can be expected to have 0.0005 per cent minimum boron content.

Phosphorus and sulphur limitations for each steelmaking process are: Basic electric furnace—0.025 max per cent; basic open hearth—0.04 max per cent; acid electric furnace—0.05 max per cent; acid open hearth 0.05 max per cent.

Minimum silicon limit for acid open-hearth or acid electric furnace alloy steel is 0.15 per cent.

Small quantities of copper are present in alloy steels which are not specified or required. This element is considered as incidental and may be present in an amount not exceeding 0.35 per cent.

Because of present restrictions on molybdenum new steels in Table II are now being made for *immediate use*. Ranges and limits apply to steel not exceeding 200 square inches in cross-sectional area, or 18 inches in width, or 10,000 pounds in weight.

TABLE I

80Bxx
Chemical Composition Limits, per cent

Grade	C	Mn	Si	Ni	Cr	Mo
80B20	0.17/0.23	0.45/0.70	0.20/0.35	0.20/0.40	0.15/0.35	0.08/0.15
80B25	0.21/0.28	0.50/0.75	"	"	"	"
80B30	0.27/0.34	0.55/0.80	"	"	"	"
80B35	0.32/0.39	0.65/0.95	"	"	"	"
80B40	0.37/0.43	0.70/1.00	"	"	"	"
80B45	0.42/0.50	"	"	"	"	"
80B50	0.47/0.55	"	"	"	0.25/0.50	"
80B55	0.50/0.60	"	"	"	0.30/0.55	"
80B60	0.55/0.65	"	"	"	"	"

81Bxx

81B35	0.32/0.39	0.70/1.00	0.20/0.35	0.20/0.40	0.30/0.55	0.08/0.15
81B40	0.37/0.45	"	"	"	"	"
81B45	0.42/0.50	"	"	"	"	"
81B50	0.47/0.55	0.75/1.05	"	"	0.35/0.60	"

94Bxx

94B17	0.14/0.20	0.70/1.00	0.20/0.35	0.30/0.60	0.30/0.55	0.08/0.15

TABLE II

Chemical Composition Limits, per cent

Grade	C	Mn	Si	Ni	Cr	Mo
S115	0.13/0.19	0.70/1.00	0.20/0.35	0.20/0.40	0.30/0.55	0.08/0.15
S117	0.14/0.20	"	"	"	"	"
S120	0.17/0.23	"	"	"	"	"
S122	0.19/0.25	"	"	"	"	"
S125	0.21/0.28	"	"	"	"	"
S127	0.24/0.31	"	"	"	"	"
S130	0.27/0.34	"	"	"	"	"
S132	0.29/0.36	"	"	"	"	"
S135	0.32/0.39	"	"	"	"	"
S137	0.34/0.42	"	"	"	"	"
S140	0.37/0.45	"	"	"	"	"
S142	0.39/0.47	"	"	"	"	"
S145	0.42/0.50	"	"	"	"	"
S147	0.44/0.52	"	"	"	"	"
S150	0.47/0.55	0.75/1.05	"	"	0.35/0.60	"
S155	0.50/0.60	"	"	"	"	"
S160	0.55/0.65	"	"	"	"	"
Modified S615	0.13/0.19	0.70/1.00	0.20/0.35	0.40/0.70	0.55/0.80	0.08/0.15
Modified S617	0.14/0.20	"	"	"	"	"
Modified S620	0.17/0.23	"	"	"	"	"
Modified S622	0.19/0.25	"	"	"	"	"
Modified S625	0.21/0.28	"	"	"	"	"
Modified S627	0.24/0.31	"	"	"	"	"
Modified S630	0.27/0.34	"	"	"	"	"
Modified S632	0.29/0.36	"	"	"	"	"
Modified S635	0.32/0.39	"	"	"	"	"
Modified S637	0.34/0.42	"	"	"	"	"
Modified S640	0.37/0.45	"	"	"	"	"
Modified S642	0.39/0.47	"	"	"	"	"
Modified S645	0.42/0.50	"	"	"	"	"
Modified S647	0.44/0.52	"	"	"	"	"
Modified S650	0.47/0.55	"	"	"	"	"
Modified S655	0.50/0.60	"	"	"	"	"
Modified S660	0.55/0.65	"	"	"	"	"

(*Continued from Page 113*)

bides, though extremely hard, tend to wear away, erode, or gall under high-pressure, high-speed intimate "frictional" contact in the cutting process, and tool flank wear is considered the limiting factor of normal carbide tool life. Thermal expansion of carbide is one third that of steel, and one fourth that of brass. Thermal conductivity is double steel's and half that of brass.

Strength is difficult to compare. Actual fracture of carbides occurs frequently due to thermal shock in improper brazing or tool design, or because of shock loads in cutting rough or scaly materials and in interrupted cuts where impact loads are high. With carbides toughness varies inversely with hardness. The hardest carbide is the most brittle; the softest carbide is the toughest.

Carbides wear in two ways—by wear of the tooth flank behind the cutting edge and by cratering of the tooth face. As the carbide flank or the clearance surface wears, a land is produced which rubs over the work piece, heating the tool and work. When the wear land reaches about 0.030-inch the tool usually is removed from service.

Cratering is caused by the chip rubbing over and eroding the tooth face. Cratering in itself does not necessitate removal of the tool from service. However if the cratering is excessive the carbide is weakened in the vicinity of the cutting edge and localized breakdown may occur.

Finally, carbides may fail by breakage either at some local point along the cutting edge or by complete fracture of the carbide. Naturally, shock loads, such as are experienced in discontinuous cuts tend to produce this type of failure. Brazed carbides also have a tendency to fracture when the carbide is overheated in service, due to the uneven expansion properties of carbide and steel onto which the carbide is brazed. Failure of this type is common when machining at high cutting speeds where high tool temperatures are attained, especially as the carbide wears. Failure of this type can be alleviated by the use of clamped-on carbides.

The harder carbides have a greater tendency to resist flank wear. These carbides are usually of the straight tungsten carbide type which have a more pronounced tendency to crater when cutting steels which normally form a continuous chip. Crater resistance is brought about by the addition of titanium and/or tantalum either as a new compound or as titanium carbide or tantalum carbide.

Procedure for determining the most

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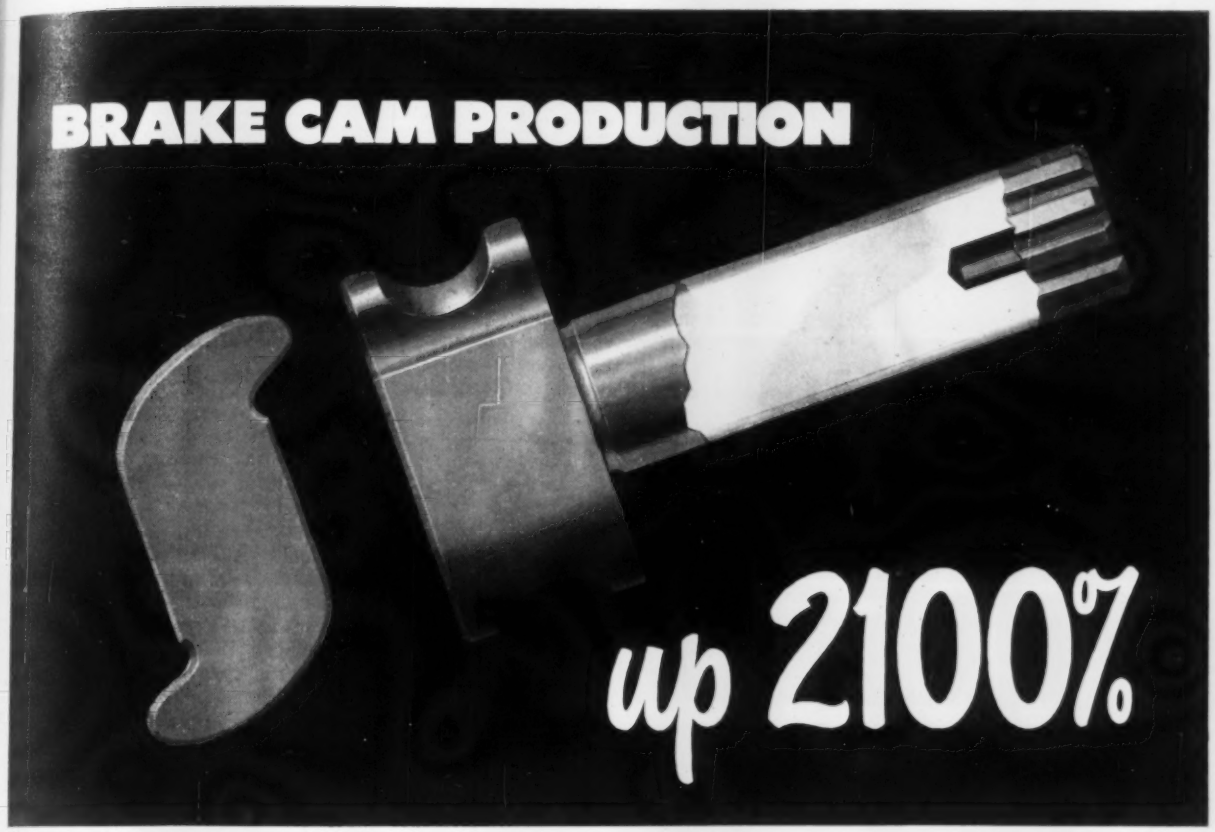

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suitable grade of carbide usually starts with trial under controlled conditions of a general purpose grade. Careful inspection and analysis of the kind of wear or failure which occurs will usually suggest the direction to go in trying for improvement. The magnitude and total cost of a job will determine how much time can be spent economically in making these trials. Two cautioning statements should be made: (1) Oversimplification of carbide inventories is costly. Small variations or deviations from closely similar machining conditions can cause tremendous differences in machinability. Enough types of carbide should be maintained in stock to suit a wide range of machining conditions. (2) In general, the harder carbides, and those with less crater resistance will give longer tool life in terms of metal removed for a given flank wear. Therefore, don't sacrifice tool life by specifying excessive strength or crater resistance. In other words, use the hardest and least crater resistant tool possible.

Proper selection of carbides depends on many factors and it is important to understand basic principles before going to the selection tables and charts which are intended as general guides only. Finally, tests should be made on every job before making the final decision, to a degree of thoroughness in proportion to the total production quantity and cost involved.

The comparatively new and difficult to machine high-temperature alloys illustrate this point. Steel-cutting grades of carbides were recommended, but they afforded comparatively poor tool life. The carbide which eventually proved to be the best was the one least suspected!

Ribbon Heaters Boost Output

Replacement of two oil-fired galvanizing kettles with resistor heating units has resulted in improved manufacturing methods at the Anchor Post Products Inc., Baltimore. The electric heating equipment, made by General Electric Co., is used in the manufacture of Anchor fences.

Prior to installing the electric galvanizing kettles, company engineers conducted a thorough study to determine the type of equipment best suited to their needs. They chose electric heating because its efficiency reduced the time required to galvanized fabric, posts and fittings. Quality and output of fences were increased as a result of the new type heating process, which resulted in a notable saving in production costs. Each kettle is heated by ribbon elements mounted on the adjacent furnace wall. Spotty heating is eliminated and less heat is radiated improving working conditions.

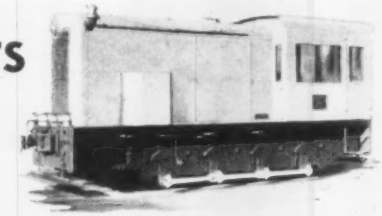
Fast Fasteners Developed

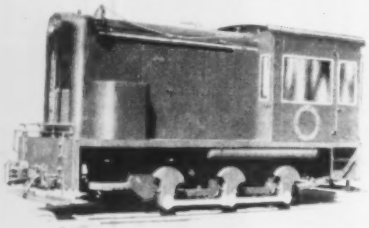
New push-on type of Speed Clip for rapid fastening of an insignia onto an automobile glove compartment door was recently announced by Tinnerman Products Inc., Cleveland. The push-on is designed to be slipped onto L-shaped studs on either end of the insignia. After the insignia is located by inserting the studs through two holes in the glove compartment door a push-on is slipped over the studs at either end and forced against the inside of the door panel. The clip is then locked in place by pressing it flat and sliding the single-prong form of clip under offset in the stud.

Cranes Dieselized

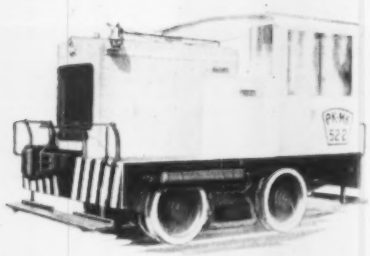
A newer application of diesel power is the conversion of locomotive and steam-powered cranes. A recent installation for this type unit was completed at Walworth Co.'s works in Greensburg, Pa. This installation is in a 15-ton Link-Belt locomotive crane employed to switch and spot cars in the yard as well as to handle

HAULAGE 24 HOURS PER DAY
at LOWEST TON-MILE COSTS
•
BUILT for HARD WORK





and BUILT to LAST



DAVENPORT Better-Built LOCOMOTIVES are AVAILABLE in STEAM FIRELESS GASOLINE DIESEL with ELECTRIC HYDRAULIC or MECHANICAL DRIVE

A half century of building fine locomotives for virtually every type of haulage operation has taught us how to build RESERVE STAMINA into the rail power units we produce. Whatever your haulage requirements you may choose a Davenport that is JUST RIGHT for YOUR NEEDS.

to Owners of H. K. PORTER LOCOMOTIVES

We have purchased the locomotive business of H. K. Porter Company, Inc. of Pittsburgh, Pa., and wish to assure all owners of Porter Locomotives that we are prepared to extend friendly and helpful service on repair parts—or duplicate locomotives to H. K. Porter design.

Complete Information on Request

EXPORT OFFICE—50 CHURCH ST., NEW YORK 7, N. Y. CABLE "BROSITES"

DAVENPORT LOCOMOTIVE WORKS
A DIVISION OF DAVENPORT BESLER CORPORATION, DAVENPORT, IOWA

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

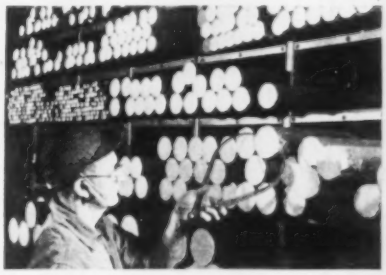
150,000 Stainless Spoons from Striking Dies of XX Carbon

The shaping of stainless steel can be a tricky job. A leading cutlery maker, faced with new problems in starting the production of stainless flatware, asked Bethlehem to recommend a tool steel suitable for striking dies. (The master dies are hand-engraved by craftsmen in the traditional fashion of this intricate art.)

The manufacturer adopted our recommendation of Bethlehem XX Carbon Tool Steel for this difficult operation. Results have been highly satisfactory. Spoons and other flatware are struck in quantities exceeding 150,000 pieces from one impression of the striking dies.

XX Carbon Tool Steel offers many advantages for general-purpose tools and dies. It's easy to machine and heat-treat; it develops a hard case, reinforced by a tough, shock-resisting core; it holds a keen cutting edge; it's economical; and there's a range of carbon content to meet many different requirements.

We closely control the hardenability of this grade, and give it a careful and uniform spheroidize-anneal. Bethlehem Carbon Tool Steels are the kind you can rely on for top performance.



Prompt shipment to our distributors is made possible by our modern tool-steel depot at Bethlehem, Pa. Complete sizes of 23 different grades are stocked.

Tool Steel Distributors Give Service in a Hurry

Delivering tool steel in a hurry is only one of the many services performed by the distributor. He knows local requirements, and he carries large stocks of the tool steel grades and sizes that his customers are most likely to require. He's ready at any time to go into action to see that your tool steel needs are taken care of, whether it means cutting bars to exact size or lending a hand in recommending the kind of heat-treatment you'll need.

Having a tool-steel distributor in your neighborhood makes it unnecessary for you to carry large inventories of tool steel . . . and he often carries other steel specialties that you use frequently.

Distributors of Bethlehem Tool Steels are reputable, experienced firms. They render a real service in all parts of the country. We are proud to have them so closely linked with our sales organization.

Our Tool Steel Engineer Says:

Use thermocouple when you pack-harden tools

Whenever tools are pack-hardened (to reduce the scaling and decarburization) place a thermocouple *in the pack* against the tools so that the time the *tools* are at heat can be determined accurately.

Recently a 34-in.-diameter die ring of our Lehigh H (high-carbon, high-chromium) Tool Steel was pack-hardened by an experienced heat-treater. Treatment completed, he checked the hardness and was flabbergasted to find that he had obtained a hardness of only Rockwell C-48. Then he checked his pyrometer charts which proved, he thought, that he had followed the recommended heating cycle. Why the low hardness?

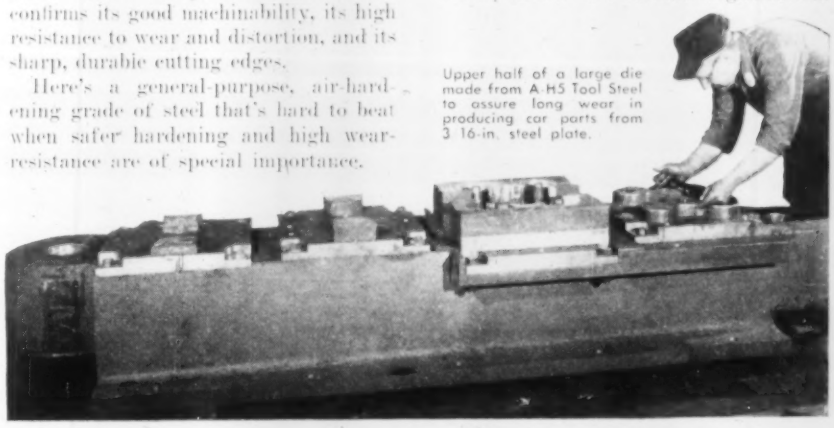
A Bethlehem trouble-shooter suggested that he insert a thermocouple in the pack against the ring. He did so, and this time got a hardness of Rockwell C-60—proving that in the first treatment the die ring wasn't heated long enough to reach the proper temperature, even though the records of the furnace heating cycle appeared to indicate correct treatment.

BIG DIE OF A-H5 MAKES CAR PARTS

A massive die produces spring plates from 3/16-in. steel plate for hopper cars, at the Berwick, Pa., plant of American Car & Foundry. All wearing surfaces of the die, which performs a punching, blanking, and forming operation, are made of A-H5 Tool Steel.

This leading car-builder uses this 5-pct-chromium, air-hardening tool steel to produce car parts from carbon steel, low-alloy high-tensile steel, and aluminum. A.C.F.'s experience with A-H5 confirms its good machinability, its high resistance to wear and distortion, and its sharp, durable cutting edges.

Here's a general-purpose, air-hardening grade of steel that's hard to beat when safer hardening and high wear-resistance are of special importance.



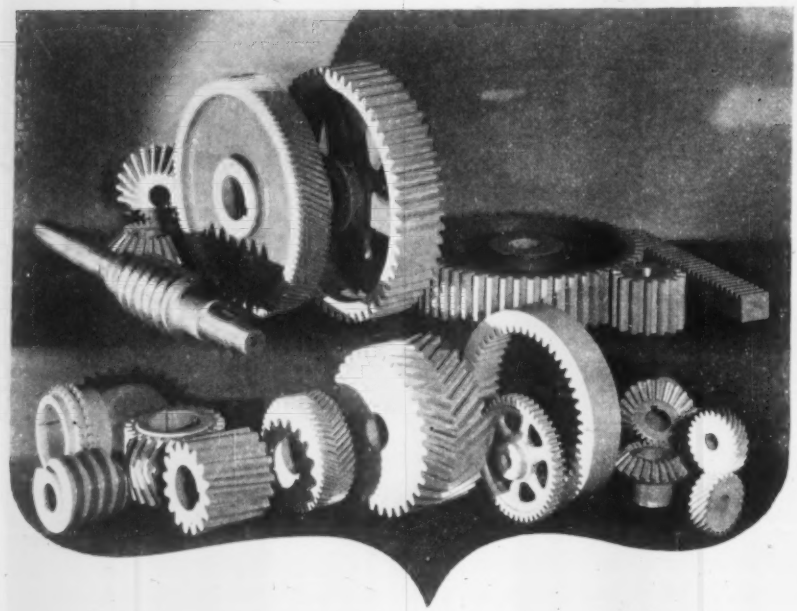
Upper half of a large die made from A-H5 Tool Steel to assure long wear in producing car parts from 3 16-in. steel plate.

Bethlehem ULTRASONIC TESTED **Tool Steel**

INDUSTRIAL GEARS

for every purpose from

an ounce **to 20,000 lbs.**



• Whether you require Spur, Spiral, Herringbone, Bevel, Mitre, Internal or Worm Gears—Worms or Non-Metallic Pinions... here they are... the finest made. For over a half century Horsburgh & Scott has specialized in making gears that represent the best in engineering design; accurate workmanship and fine materials. Economical too, for they are standardized and built to endure. With a complete line of all types and sizes . . . here's one source for all gears and gear products.

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVE. • CLEVELAND 14, OHIO, U.S.A.

Send note on Company Letterhead for 488-Page Catalog 49

raw materials with clamshell bucket or magnet.

The crane has been repowered with a Caterpillar D315 steam crane conversion package consisting of a 73 bhp (at 1800 rpm) diesel engine directly connected to a clutch and Twin Disc 10,000 series torque converter. Immediately behind the torque converter, an integral chain housing is mounted for chain driving the drive shaft formerly powered by a 100 hp gasoline engine. The clutch, torque converter and chain housing are packaged in one assembly.

Patent Development Service

A new bulletin service, "Patent Development," offers current information on all phases of invention. Written by a patent development engineer, the bulletins show how to evaluate ideas and provide reliable counsel on procedure.

Subscribers receive a loose-leaf binder containing bulletins on what to invent, patents and presentations, the functions of a patent attorney, contracts and agreements, shop rights, patent coverage, joint inventions and models. Succeeding bulletins, issued monthly as supplements to the original work, will elaborate on these subjects and discuss others in the same field. Subscriptions or requests for more information should go to the publisher, Visioneering Inc., Security Bldg., West Bend, Wis.

Special Machine Does 104 Jobs

One of the longest special machine tools ever built has been delivered to a large automotive supplier by Cross Co., Detroit. It is a 90-foot Transfer-matic equipped with automatic devices to transfer parts from station to station. It drills, mills and taps automatic transmission cases performing 104 operations on 86 pieces per hour at 100 per cent efficiency.

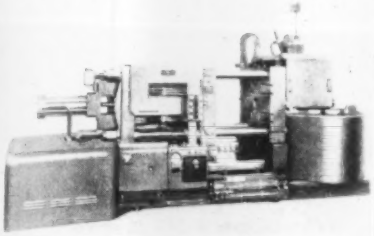
Machine has 54 stations: 1 loading, 6 milling, 23 drilling, reaming and counter-boring, 2 tapping, 21 inspection, 1 unloading. In normal operation, it takes one transmission case almost an hour to progress through all stations. Only one unskilled operator is required to load and control the operations.

Incorporated in the equipment is the Cross machine control unit with Toolometer which automatically stops the machine when any tool requires changing. Readily available pre-set tools reduce downtime. Other features include hardened and ground ways, hydraulic feeds, automatic chip conveyors and use of standard units to facilitate maintenance and provide flexibility for part design changes.

New Products and Equipment

Improved Die Casting

Improvements in No. 2 and No. 2G combination die casting machines are announced by Reed-Prentice Corp., Worcester 4, Mass. High pressure plunger gooseneck attachment of the No. 2 model for zinc, tin or lead base alloys is readily interchangeable with the high pressure cold chamber at-



tachment of the No. 2G model for aluminum, magnesium and brass alloys. Same die locking end of machine, including the movable and stationary die plates, operates with either attachment.

A 20 hp motor and larger hydraulic pump combine to provide faster machine cycles assuring greater hourly production. No. 2 machine, illustrated, has a maximum shot capacity of 15 pounds (zinc) while No. 2G model has a maximum capacity of 9 pounds (aluminum). For opening and closing of die and other machine functions, both machines contain a centralized control station having a new type of lever wide enough for either thumb or palm operation. This lever construction prevents interlocking of opposite action. Positive electrical interlocks eliminate all danger of shooting the metal until the dies are securely closed.

Check No. 1 on Reply Card for more Details

Gives Quick Lift

Type JC electric chain hoist made by Robbins & Myers Inc., 1934 Clark Ave., Springfield, O., is available in ¼, ½ and 1 ton capacity. Designed for hook suspension, it is adaptable for trolley mounting with the R & M Bulldog trolley.

Constructed of high strength cast aluminum alloy with heat-treated gearing and high carbon or alloy steel ground shafts, the type JC hoist is equipped with precision ball bearings. Entire gear train is enclosed in an air-tight case and operates in an oil bath. Link type steel chain, single on the lightest unit and double on the two heavier models, provides a natural flexible lift. It can be adapted to any length lift, depending upon ceiling height or lift required, by adding necessary length of chain and control ropes.

Check No. 2 on Reply Card for more Details

Simplifies Gaging

Dimensional air gage called the Dimensionair is announced by Federal Products Corp., 1144 Eddy St., Providence 1, R. I. It has exceptional measuring range and clearance combined with practically absolute stability. Range of 0.003-inch enables user to determine size of hole before ultimate size required is reached. Irregular and tapered holes are more easily gaged. After gage is in op-

eration, drift is entirely absent even after many hours of operation.

Plugs can be inserted with jets at any angle, centralizing error is at a minimum. Setting gage is simple and positive without fussy balancing of controls. Indicator hand moves quickly and positively to position without later creep. Any air pressure between 40 and 100 pounds can be used. Amplification is 2500 to 1. Tolerances are easily read directly on scale as on a dial indicator.

Check No. 3 on Reply Card for more Details

Automatic Abrasive Cutting

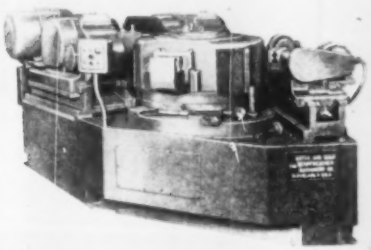
Campbell Machine Division, American Chain & Cable Co. Inc., Bridgeport, Conn., announces model 270 wet abrasive cutting machine. Solid annealed or unannealed steel up to 2 inches diameter and 3½-inch diameter tubing may be cut. Because machine is sequence timed, no adjustment of time cycle is required, regardless of the size of stock being cut or the length of the feed up to 12 inches. Every operation of machine: Stock feed, clamping, wheel feed, adjustment for wheel wear and ejection of cut pieces is completely automatic.

As abrasive wheel cuts through work, feed carriage is returned to starting position. At completion of cut, abrasive wheel lifts to up position, bar clamp is closed, clamping work in feed carriage and work clamp under wheel releases bar. Feed carriage then is moved to right against the stop. Work clamp at wheel grips stock, then bar clamp on feed carriage releases. Abrasive wheel is started downward for the cut and the cycle is repeated.

Check No. 4 on Reply Card for more Details

Fast Milling and Drilling

A range of forgings or shafts from 4 to 16 inches long can be machined at a production rate of 220 to 240 pieces per hour with simultaneous operations of milling and center drilling both ends while the operator is unloading and loading. The high production machine is made by Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, O. Machine consists of a 48-inch table holding three clamping fixtures, opposed heavy duty M-30 milling heads, and opposed single speed center drilling units mounted on heavy welded base. Machine cycle is semiautomatic. Op-



erator loads work and depresses a lever causing the vise jaws to close, clamping the stock. Cycle button then is pressed causing the index table to rotate 120 degrees. Opposed milling heads advance, feed and return. Table then is indexed 120 degrees to the center drilling station for double end operation. During the index to the unloading station the vise is automatically opened to allow the operator to unload and load stock.

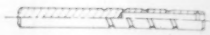
M-30 single speed milling heads are capable of face milling alloy steel pinions at 24 to 30 inches per minute feed rate and new hydraulically actuated mechanical index table give fast mechanical motion cushioned by hydraulic action. Milling heads can utilize up to 30 hp and have 2 inches of quill adjustment for cutter setting and wear. Hydraulic pump

Get cost savings like

SPINDLE SLEEVE
SAVING 18.8%

MACHINE TEST REPORT

Stock Size - 7/16" Round
Part Name - Spindle Sleeve
Machine - Davenport Model B
Cutting Media - Sulphurized Oil
Machine Operations - Face, Center Drill, Chamfer, Rough Bore, Cut-Oil Groove, Ream, Cut-Off.



COMPARATIVE PRODUCTION

Grade	RPM	SFM	Part Time (Seconds)	Gross Parts Per Hour	Production Increase (Percent)	Tool Life Increase (Percent)
B-1113	1450	265	14.7	245		
MX	2200	402	10.0	345	36.1	36.1

*ESTIMATE OF COMPARATIVE COSTS

	B-1113	MX
Net Production/Hr. at 70 Percent Efficiency	176	248
Hours to make 10,000 parts	56.8	40.3
Direct Labor (one operator to two machines) @ $1.70 Mach./Hr.	96.80	68.51
Machine Overhead @ $4.00 per Mach. Hr.	$227.20	$161.20
Conversion Cost	$324.00	$229.71
Material Cost	$104.54	$104.54
Total Manufactured Cost of 10,000 Parts	$428.54	$334.25
Saving	$94.29 = 18.8 Percent	

*Note - Estimate of comparative cost from the manufacturer's data here given, calculated on the basis of assumed rates for Direct Labor and Machine Overhead and Machine Efficiency.

SCREW
SAVING 20.6%

MACHINE TEST REPORT

Stock Size - 11/32" Round
Part Name - Screw
Machine - Brown & Sharpe #0G
Cutting Media - Sulphurized Oil
Machine Operations - Drill, Rough and Finish Form, Thread, Cut-Off

COMPARATIVE PRODUCTION

Grade	RPM	SFM	Part Time (Seconds)	Gross Parts Per Hour	Production Increase (Percent)	Tool Life Increase (Percent)
B-1113	1750	150	18.33	196		
MX	2240	192	15	240	29	29

*ESTIMATE OF PRODUCTION COSTS

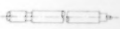
	B-1113	MX
Net Production/Hr. at 75 Percent Efficiency	140	180
Hours to make 10,000 parts	71.4	55.5
Direct Labor (one operator to two machines) @ $.85 Mach./Hr.	$ 60.69	$ 47.17
Machine Overhead @ $2.30 per Mach. Hr.	$178.60	$138.75
Conversion Cost	$239.19	$185.92
Material Cost	$ 17.66	$ 18.03
Total Manufactured Cost of 10,000 Parts	$256.85	$203.95
Saving	$52.90 = 20.6 Percent	

*Note - These cost figures are not those of the manufacturer, but have been calculated on the basis of assumed rates for Direct Labor and Machine Overhead and Machine Efficiency.

SHAFT
SAVING 22.4%

MACHINE TEST REPORT

Stock Size - 1/4" Round
Part Name - Shaft
Machine - Brown & Sharpe #00
Cutting Media - General Purpose (Not Sulphurized)
Machine Operations - Form (five diameters) Cut-Off



COMPARATIVE PRODUCTION

Grade	RPM	SFM	Part Time (Seconds)	Gross Parts Per Hour	Production Increase (Percent)	Tool Life Increase (Percent)
B-1113	3850	265	7.0	514		
MX	4240	277	4.5	800	55.6	55.6

*ESTIMATE OF COMPARATIVE COSTS

	B-1113	MX
Net Production/Hr. at 80 Percent Efficiency	411	640
Hours to make 10,000 parts	24.33	15.62
Direct Labor (one operator to three machines) @ $.65 Mach./Hr.	$15.81	$10.16
Machine Overhead @ $1.95 Mach. Hr.	$47.44	$30.48
Conversion Cost	$63.25	$40.64
Material Cost	$34.41	$35.11
Total Manufactured Cost of 10,000 Parts	$97.66	$75.75
Saving	$21.91 = 22.4 Percent	

*Note - These cost figures are not those of the manufacturer, but have been calculated on the basis of assumed rates for Direct Labor and Machine Overhead and Machine Efficiency.

these on your screw machine parts ...do the job with MX

the new free-machining Bessemer screw stock!

Would you spend $2.34 extra for MX to save $73.14 on the manufactured cost of 10,000 parts? Do you think a saving of $21.71 justifies spending 70 cents more for MX? Would you pay 37 cents more for MX to save $52.90?

We think you would.

Savings like these are typical of the results obtained when MX is used in place of ordinary Bessemer screw stock. Enthusiastic reports from screw machine operators emphasize the fact that whenever fast-cutting MX is put to work, production goes up and costs go down ... anywhere from 6% to 22%. In fact, you can safely figure that MX will cut the cost of *any* part you now machine from ordinary Bessemer screw stock. And the more the machine work required, the greater the savings will be. That's why, despite its slightly higher cost, MX is proving itself the most *economical* bar stock developed to date.

U·S·S Free-Machining MX cuts costs in four ways. By increasing the rate of production, *it lowers the cost per part.* By prolonging tool life *it reduces down-time.* By assuring better part finish it often *eliminates extra finishing operations.* By providing closer dimensional accuracy, *rejections are minimized.*

If you haven't yet tried MX on a production basis, do it soon.

U·S·S Free-Machining MX is being produced in all the popular bar sections and sizes. You can obtain it in cold finished form from your regular supplier as "MX" or under his own identifying trade name. In hot rolled form MX is available direct through our nearest district sales office.

For more parts and better parts—at lower cost per part—standardize on MX.

USE THIS COUPON

United States Steel Company
Room 4241 Carnegie Building, Pittsburgh 30, Pa.

Please send me a copy of the MX bulletin

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Address.....

Company.....

City..... Zone.... State.....

USS TRADE MARK

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TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM · UNITED STATES STEEL COMPANY, PITTSBURGH
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
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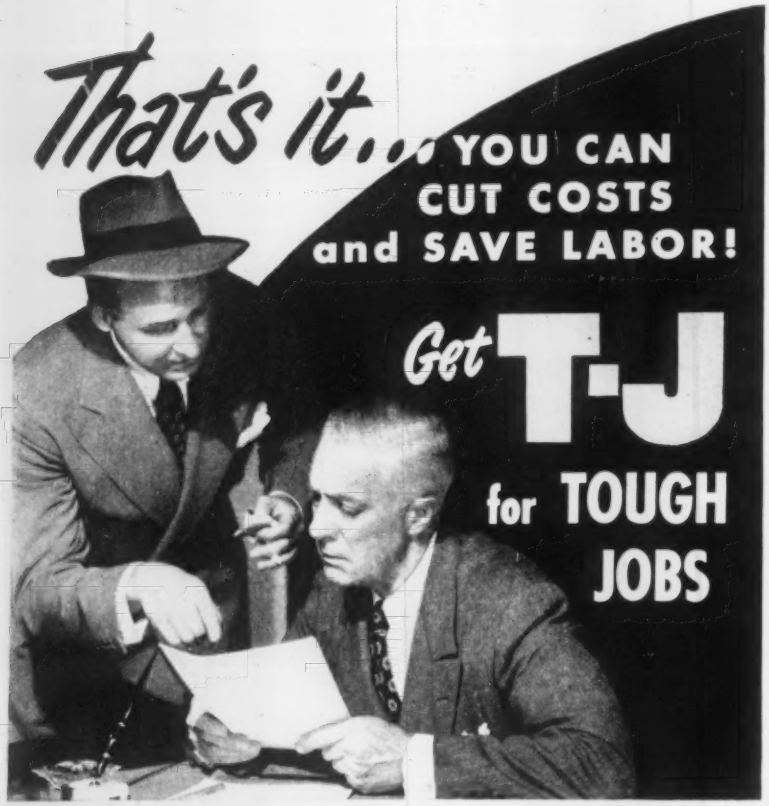
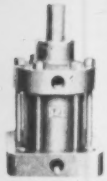
1-336

UNITED STATES STEEL





HYDRAULIC CYLINDERS

AIR CYLINDERS

A tip for you on trimming costs—put T-J products to work in your plant! Engineered to *save labor* and give you *plus performance* in a wide range of applications.

For those "muscle jobs" of pushing, pulling or lifting—100 lb. or 50,000 lb.—save money by mechanizing with T-J Air and Hydraulic Cylinders! For high production in rivet-setting, specify T-J Rivitors with automatic feeding and setting . . . air or electric power. For setting clinch nuts in automotive body panels, door locks and other products . . . set 'em 3 to 5 times faster with T-J Clinchors! For more work between grinds in tough die steels . . . T-J Cutters! For accurate, automatic control of presses, brakes, other machines and equipment . . . T-J Air Controls.

That's it—get T-J *all the way* for tough jobs! Send for latest catalogs. The Tomkins-Johnson Co., Jackson, Mich.

RIVITORS

CLINCHORS

CUTTERS

AIR CONTROLS

T-J 34 YEARS EXPERIENCE

TOMKINS-JOHNSON

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

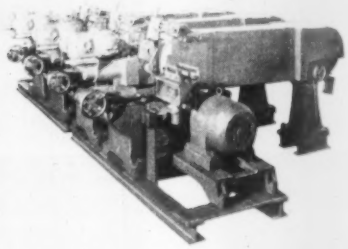
is driven by 7½ hp, 1200 rpm motor. Lubrication of all moving parts is automatic.

Check No. 5 on Reply Card for more Details

High Speed Polishing

Cylindrical work may be polished with high speed centerless polishing machine made by Production Machine Co., Greenfield, Mass. Nearly any desired finish may be obtained if a sufficient number of machines are used in the installation. Simple adjustments within reach of the operator permits a range of feeding speeds upward of 70 fpm. Design includes a large wheel spindle with capacity for contact wheel or buffs up to 6 inches wide.

Because of the high speed of operation and the fact that most tube polishing operations require several passes, these machines usually are



installed in tandems of from two to six units. Photograph illustrates a typical installation of four machines, the first three equipped with idler backstands and a fourth machine arranged to use a buff for final operation. Adjustable roller fixtures are provided to support the work as it automatically passes from one machine through to final buffing operation. Separate motor with variable speed pulley permits the infinite range of rotation of speed belt or roll. It may be adjusted to rotate from 40 to 100 rpm. A minimum of floor space is required by the motor support which accommodates up to 10 hp, 1800 rpm motors.

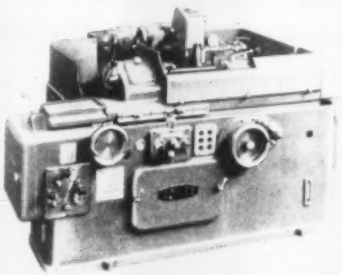
Check No. 6 on Reply Card for more Details

Thread and Worm Gear

Both production and toolroom operation in thread and worm grinding can be performed on the Reishauer type NRK universal thread and worm grinder. Machine is made in Switzerland and distributed in the United States by Cosa Corp., 405 Lexington Ave., New York 17, N. Y. Internal threads up to 5 inches in diameter may be ground on this machine with suitable attachments and it will also grind and relief grind

external threads, right or left hand, single or multiple. Threads can be ground to any profile that may be desired.

It operates on two basically different grinding methods: Longitudinal feed principle for single thread grinding wheels, and the in-feed or plunge cut principle for multithread grinding wheels. Longitudinal feed method is used mostly for grinding thread gages, spindles, worms and long thread taps and when length of thread is more than 1.575 inches. The in-feed method is for production



grinding of small thread taps, thread milling cutters, thread chasers and threads on screws, bolts or similar parts requiring ground finishes. Grinder admits workpieces between centers up to 28 inches long. It grinds threads to a maximum length of 17½ inches, from 0.120-inch to 8 inches thread diameter, with a pitch range from 16 threads per inch to 3 inches. Grinding wheels speeds are 1550 or 1900 rpm and work spindle speeds range from 1.6 to 80 rpm.

Check No. 7 on Reply Card for more Details

Transformer Arc Welder

Wilson Bumblebee arc welder, available as indoor or all weather models, are announced by Air Reduction Sales Co., a division of Air Reduction Co. Inc., 60 E. 42nd St., New York 17, N. Y. Features include: Instant arc starting, wide current range, easy to operate controls and minimum maintenance. Automatic "hot-start" control with arc stabilizing capacitors are provided on the 300 and 400 amp models. Current ranges are: 60 to 375 for the 300 amp model, 80 to 400 for the 400 amp model and 100 to 675 for the 500 amp model. Water-repellent silicone insulation means safety at high temperatures without breaking down.

Check No. 8 on Reply Card for more Details

Adds Storage Space

An auxiliary lift attachment, introduced by Automatic Transportation Co., 149 W. 87th St., Chicago 20, Ill., adds more than 5 feet to a fork truck's maximum lift. It is for use

They pinned a medal on "BILL"

That bright suggestion of switching to Simonds Abrasive Company grinding wheels sure paid off for Bill. Output's up and costs are down. The production line is clicking like clockwork and the boss is pleased. Maybe there's an operation in *your* plant that can be done more efficiently and economically by using Simonds wheels, slightly different, but more adaptable to your jobs. Everything in our complete line is accurately specified . . . grinding wheels, mounted wheels and points, segments, abrasive grains. Write for free data book and the name of the Simonds distributor ready to serve you.

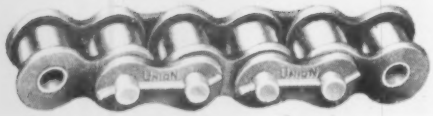
SIMONDS ABRASIVE CO.
grinding wheels

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA.
DISTRIBUTORS IN ALL PRINCIPAL CITIES

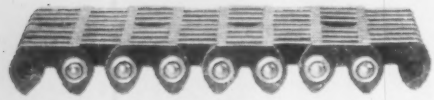
Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd. Arvida, Que.

Wherever You are...

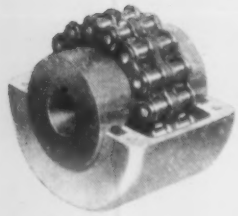
UNION CHAIN
is at your service



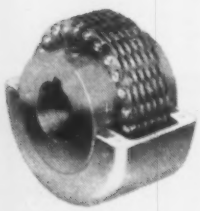
UNION ROLLER CHAIN



UNION SILENT CHAIN



UNION
ROLLER CHAIN
FLEXIBLE COUPLINGS



UNION
SILENT CHAIN
FLEXIBLE COUPLINGS

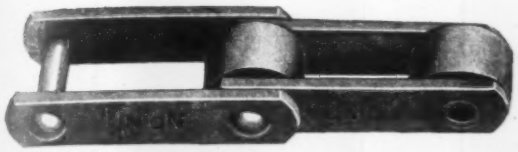
Suppose You Need a UNION Heavy Duty Chain

... for a drive or conveying application where heavy loads, slower speeds, long life and moderate cost are factors. Union Chain manufactures a complete line of these heavier types of chains, sprockets, flights and aprons, in addition to roller chain and silent chain, and is therefore in a position to make competent, unprejudiced chain recommendations.

Furthermore, an important phase of Union's service to its customers is the designing and building of special chains for unusual applications, particularly for conveying and elevating. Union is in an unusually fortunate position to render such service since we manufacture steel chains of all types and nothing else. This specialization has given us an unusual insight into problems of power transmission and conveying which our customers find valuable to them.

Perhaps we can be of help to you Your inquiry will be welcomed.

TYPICAL UNION DRIVE AND CONVEYING CHAINS



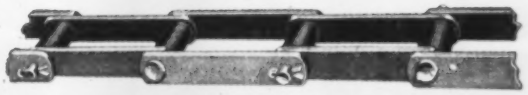
HB STRAIGHT SIDE BAR ROLLER CHAIN

BRIDGE CHAIN

BP CHAIN

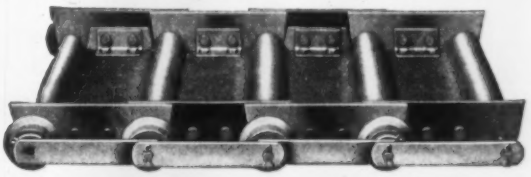
BP ICE CHAIN

HB STRAIGHT SIDE BAR BUSHING CHAIN



COMBINATION MALLEABLE IRON AND STEEL CHAIN

APRON CONVEYOR STYLE A



APRON CONVEYOR STYLE B

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Union Chain & Mfg. Co.
W. Albrecht
A. C. Mahr
B. Nelson
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Chicago, Illinois

INDIANA
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Transmission Engineering Co.
Stanley Johnson
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Newton Highlands 61, Mass.

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Pittsburgh 20, Pa.

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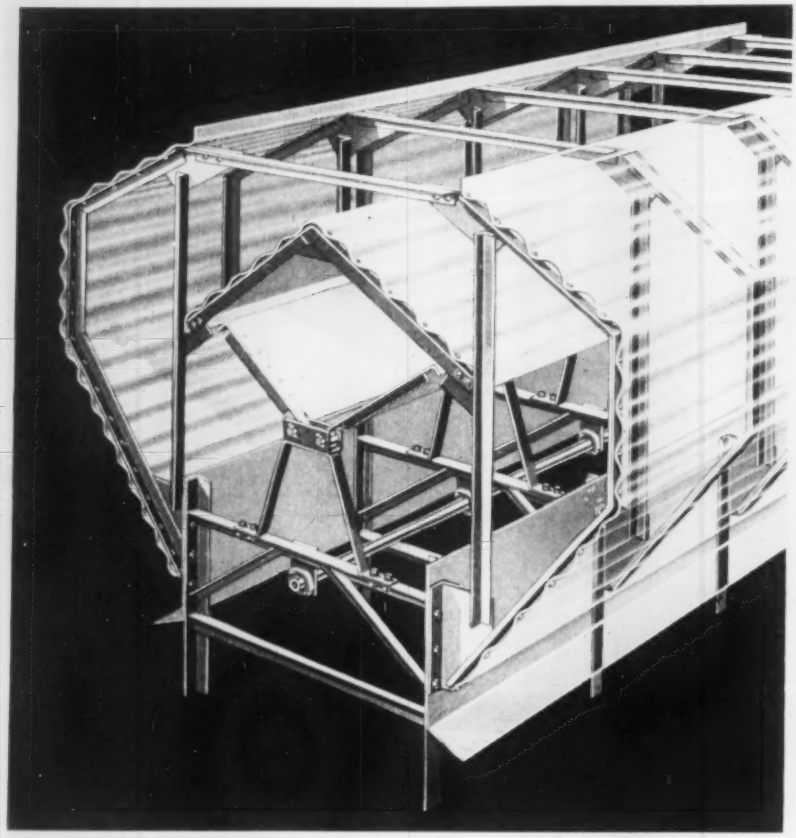
The Union Chain and Manufacturing Company — **Sandusky, Ohio, U.S.A.**

TRANSMIT POWER
UNION CHAINS
CONVEY MATERIALS

HEAT, SMOKE AND FUMES CUT PRODUCTION • FOSTER SPOILAGE



BURT MONOVENT BOOSTS PRODUCTION EFFICIENCY

No workman can do his best in bad air. Output suffers—rejects rise—accidents and absenteeism increase.

Adequate ventilation with Burt Ventilators is a quick, simple solution to the problem. Burt's complete line includes a size and type for every ventilating need. More than half a century of ventilating know-how assures top efficiency and satisfaction.

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VENTILATORS • LOUVERS • OIL FILTERS • SHEET METAL SPECIALTIES

on standard fork trucks of any capacity made by the company. Greatest value is realized where ceiling heights and nature of loads leave several feet of space under the ceiling.

It can be built in a number of sizes with the extra lift varying up to 62 inches. Overall height of the truck, which is 83 inches, is not increased by the device, permitting easy passage through standard 7-foot factory door. Auxiliary unit has its own high pressure hydraulic rams, pump and motor and is operated by simple pushbutton control.

Check No. 9 on Reply Card for more Details

Speedy Materials Handling

Heavy loads can be rapidly handled by model 2500 Kalamazoo speed truck made by Kalamazoo Mfg. Co., Kalamazoo 24, Mich. It is powered by a 2 cylinder, 13 hp air cooled Wisconsin engine.

The highly maneuverable truck has three speeds forward and one reverse, rigid shoe-type internal expanding brakes, Timken equipped steering fork and pneumatic or U.S. Innacush tires. Wheel turning radius is 64 inches. It has a deck loading area of more than 20 square feet with space beside driver's seat for long material. Standard truck has manual starter but 6 volt electric starter and generator can be furnished.

Check No. 10 on Reply Card for more Details

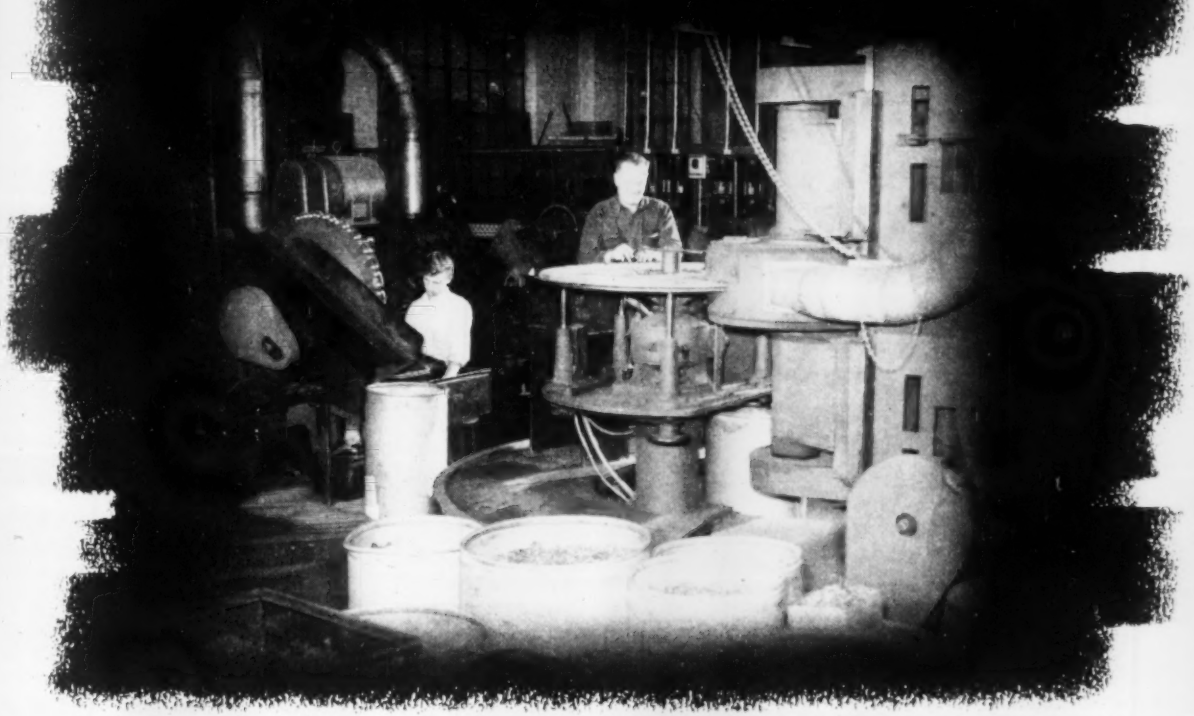
Precise Parts Location

Large work may be accurately located under the spindle of the No. 4E jig borer made by Pratt & Whitney Division of Niles-Bement-Pond Co., West Hartford 1, Conn. Location is by means of a new Electrolimit measuring system, basic 1-inch spacing being obtained from a master measuring bar by electrical means.

Master bar has rectangular projection calibrated so distance between magnetic centers of adjacent projections is 1 inch with only twenty millionth of an inch accumulated error in the full length. Two bars are built into the machine at right angles. One, 60 inches long, is on the underside of the table for positioning longitudinally. The other, 36 inches long, is on the underside of the carriage for positioning transversely. An electro-

Precision finishing

another feature of Accurate service



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the ultimate cost of your springs

THE accuracy with which the ends of your springs are finished—whether they are looped, hooked, ground or what have you—can be of vital importance to the assembly and/or operation of your product. Carelessness, poor design or use of improper equipment in this vital part of spring manufacture can add many dollars to the ultimate cost of your springs.

Here at Accurate, skilled springmakers know the importance of accuracy in finishing ends . . . we have the most modern equipment to do the job right and economically . . . and our practical, experienced spring engineers can often recommend modifications in end design to speed assembly of your product or to make it perform better.

This is just one of many reasons why Accurate service saves you money in the long run. We'll be happy to discuss what we can do for you. Write or phone today.

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WRITE TODAY for your copy of the new revised Accurate Handbook of Technical Data on Springs. It's full of short cuts for making spring calculations.

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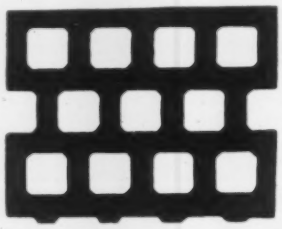
for any requirement



WITH facilities for producing any shape and size of perforations in any commercially rolled metal, of whatever gauge desired, Hendrick can furnish the most suitable form for a specific screening application.

To best meet certain requirements, Hendrick developed the "squaround" perforation illustrated. Other standard forms include round, square, hexagonal, diamond and slot perforations in hundreds of sizes of openings. Write for full information.

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Perforated Metals
Perforated Metal Screens
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Architectural Grilles
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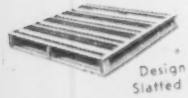
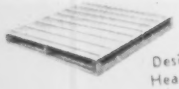
ALL STEEL
Pallet Headquarters

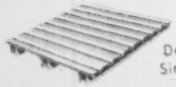
POWELL makes a COMPLETE line of Standard and Job Designed Pallets

Nesteel Stacking

Design 107 4-Way Entry


Design 104 Slatted Deck


Design 101 Heavy Duty


Design 113 Single Deck

Whatever your pallet needs . . . standard, four-way lift entry, slatted or solid bottom, reversible, Nesteel stacking or special designs for special jobs . . . your Powell representative is the man for you to see. If your require a special pallet ask your Powell representative about Powell **Job-Designed** materials handling equipment. Here Powell "know how" goes to work for you to design and build to the exact requirements of the job at surprisingly low cost. Whatever your pallet needs . . . Powell is the name to remember.

NOTE: Because of present conditions general order steel is in short supply. If you can furnish a D. O. Government Contract number with your order faster delivery is assured.

POWELL PRESSED STEEL
SINCE 1920

POWELL PRESSED STEEL CO. • HUBBARD, OHIO
ORIGINATORS OF COLD FORMED ALL STEEL HANDLING EQUIPMENT
In Greater Youngstown Dept. 331

magnetic head detects the exact magnetic center of each projection as bar passes over head. A zero reading is registered on an indicating meter. These 1-inch spacings are further subdivided by positioning electromagnetic head between any two projections with micrometer screw.

Separate screw within micrometer screw is used to zero the head under the nearest projection on master bar to establish initial zero position on workpiece. Operator locates a hole by setting micrometer for an inch fraction and operating power rapid traverse until reference scale reads to approximate setting. Final adjustment is by handwheel.

Check No. 11 on Reply Card for more Details

Portable Air Power

Model WH-105 two stage, portable air compressor is introduced by Gardner-Denver Co., Quincy, Ill. It is powered by Hercules model QXD-5 six-cylinder engine with 3⅞-inch

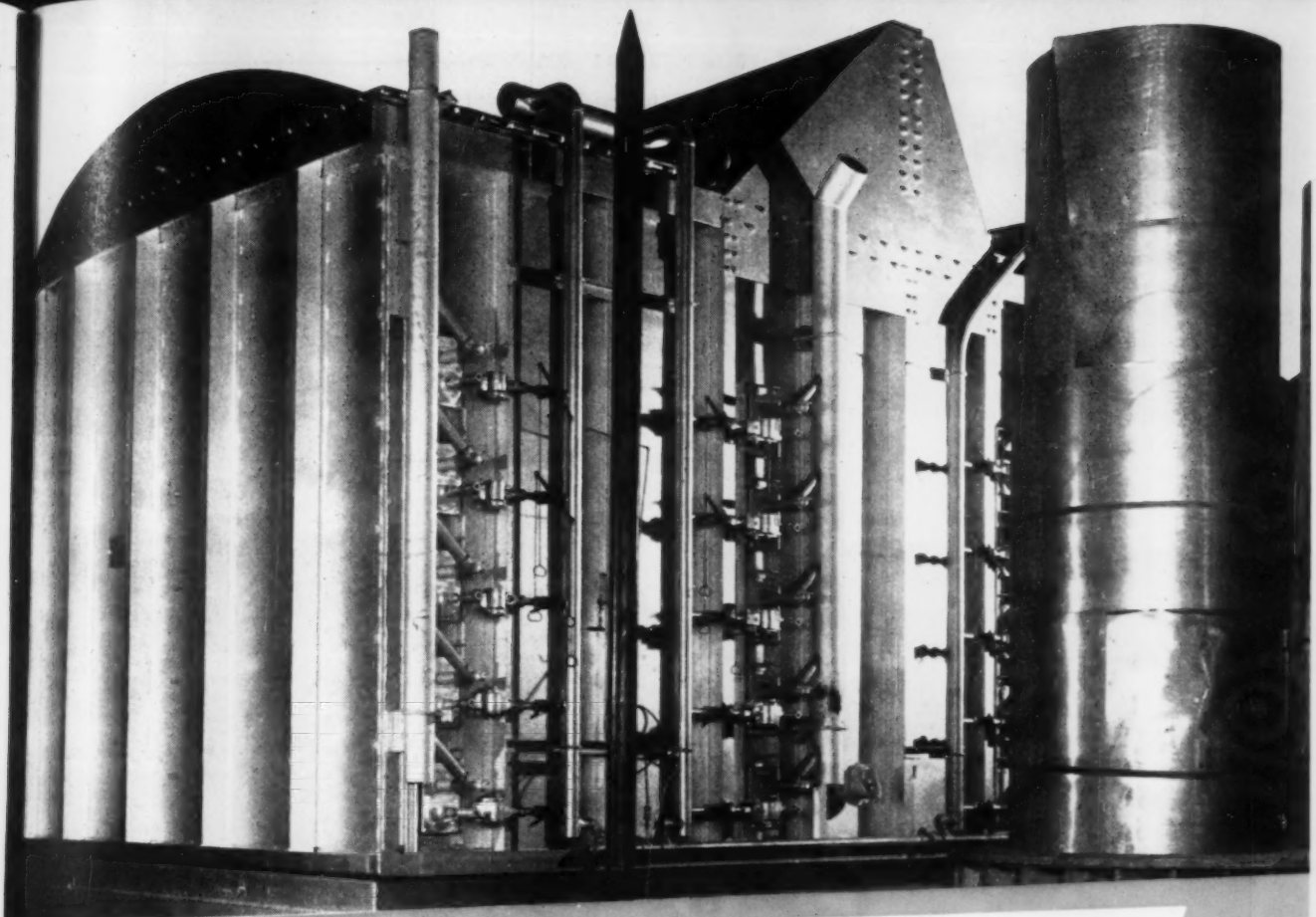
bore and 4½-inch stroke. Piston displacement is 230 cubic inches.

Compressor is an all-water cooled 105 cubic feet per minute unit that assures cooler air controls and minimizes upkeep. Being a two-stage air compressor it insures the user adequate rated capacity at any altitude. Air is compressed to 28 psi in the first stage, cooled back almost to atmospheric temperature in a radiator-type intercooler and boosted to final discharge pressure in the second stage. Improved unloader pilot operates the suction unloading valves within a fixed range and automatically throttles the engine to idling speed and unloads the compressor. The engine accelerates to full operating speed just prior to the compressor going on load.

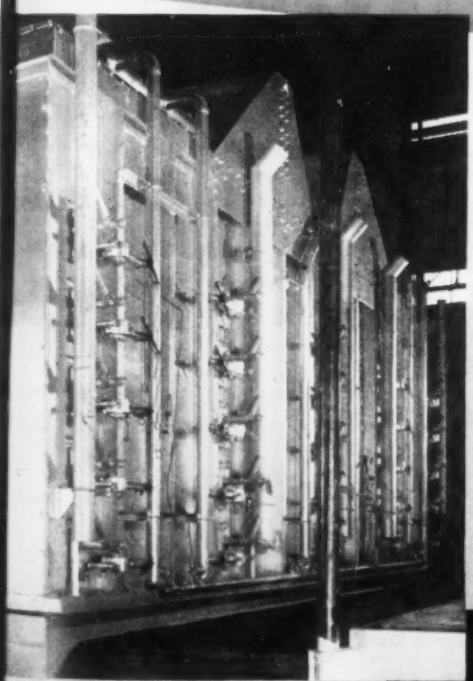
Check No. 12 on Reply Card for more Details

Large Heat Output

A standard line of direct fired heaters with capacities ranging from 100,000 to 15 million Btu per hour is announced by Struthers Wells Corp.



SWINDELL-DRESSLER



. . . constructs for JONES & LAUGHLIN the largest* coil sheet annealing furnace ever built.

Designed for high-speed production, the unit has every proved modern advantage—among them, high-capacity base fans plus high fuel input, contributing to outstandingly greater tonnage handled per shift. • Let Swindell-Dressler consult with you on your own annealing-furnace requirements.

**To the best of our knowledge, this 37′x19′ furnace is the largest built to date in its field.*

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Designers and Builders of Modern Industrial Furnaces

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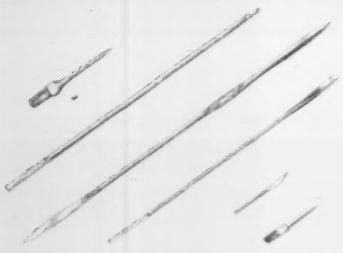
CUT COSTS

have your metal parts precision-made by

TORRINGTON



Special equipment and volume production enable us to make precision parts for you at much lower costs.

For example, highest quality special needles for textile, leather, paper, etc., machinery. Pins for printing presses and surveyors' instruments. Special equipment assures proper heat-treatment . . . accurately formed eyes, grooves and shanks . . . precisely sharpened points . . . clean milling, knurling, slotting, and bevelling. Needles hand-straightened.

We are also set up to make such parts as knurled mandrels and spindles, screw driver and ice pick blades, instrument shafts and pivots, surgical and dental instruments, pen and pencil barrels, special rollers, studs, dowel pins, etc.

Send your prints and specifications today for a prompt quotation.

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Specialty Department
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Makers of
TORRINGTON NEEDLE BEARINGS

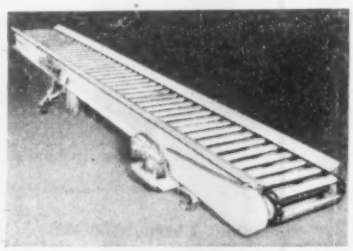
Warren, Pa. Equipment is designed for a wide range of applications including indirect circulating heating using heat transfer mediums such as Dowtherm and for direct heating of vapors and liquids. Temperatures range to 750° F or above.

Equipment is designed for high thermal efficiencies and trouble free operation. Complete automatic control systems are available which largely eliminate operating attention. Completely engineered systems including all necessary equipment are available if required.

Check No. 13 on Reply Card for more Details

Parts Handling Eased

Ease and flexibility in handling of heavy crates, boxes, parts, etc., is provided by new portable heavy-duty slat conveyor, announced by Samuel Olson Mfg. Co., 2423-25 Bloomingdale Ave., Chicago 47, Ill. No. 2080 portable slat conveyor is



available in lengths from 15 to 25 feet and widths from 24 to 36 inches. It has a hydraulic elevating and lowering device at upper end for convenient height adjustment. On 20 foot conveyors, the upper end can be adjusted to any height from 3 feet 2 inches to 5 feet 2 inches and height of lower end can be set between 11 and 13 inches. Reversible operation permits use for either loading or unloading at a standard speed of 40 feet per minute.

Conveyor is mounted on heavy-duty ball-bearing casters. Floor locks are provided for maintaining any desired position. Heavy steel construction permits carrying concentrated loads up to 800 pounds. It is powered with ¾-hp gear head motor. Twenty-five foot long rubber covered cable is provided for plug-in connection.

Check No. 14 on Reply Card for more Details

Adaptable to Many Jobs

An air operated staking machine introduced by High Speed Hammer Co. Inc., Rochester, N. Y., is expressly designed for staking or riveting fixed or movable joints. Its adaptability, however, covers such operations as eyeletting, inserting grom-

WHAT'S THE BEST WAY TO STRIP PAINT FROM METAL PARTS TOO LARGE TO BE SOAKED IN TANKS?

See Page 3

Oakite's New FREE Booklet on Paint Stripping

answers many questions that will lead you to better stripping procedures. You'll want to read more about:

What's the best way to strip large areas of structural metal where a steam supply is available? *See page 5.*

What is the best method when steam is not available? *See page 7.*

What is the cheapest way to strip metal parts in large volume? *See page 9.*

What are the best ways to prepare stripped surfaces for repainting? *See page 11.*

What strippers are best for removing oil-base paints? . . . Synthetic enamels, alkali-resistant plastics or resin-based paints? . . . Japans, wrinkle finishes, nitrocellulose lacquers, alkyds, phenolics and ureas? *See page 12.*

FREE For a copy of "How to STRIP PAINT" write to Oakite Products, Inc., 34F Thames St., New York 6, N. Y.

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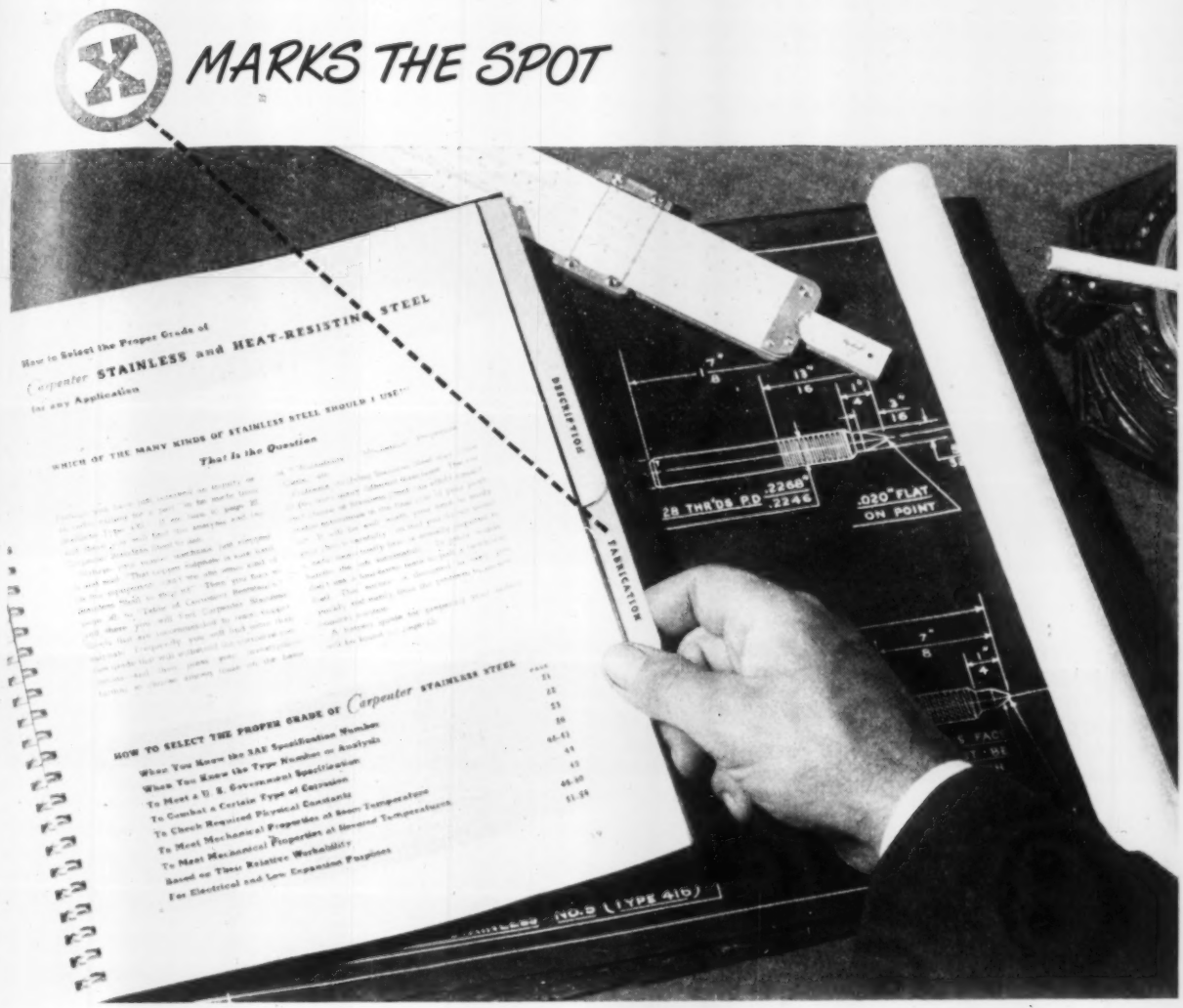

MARKS THE SPOT
How to Select the Proper Grade of
Carpenter STAINLESS and HEAT-RESISTING STEEL
for any Application
WHICH OF THE MANY KINDS OF STAINLESS STEEL SHOULD I USE?
That Is the Question
HOW TO SELECT THE PROPER GRADE OF Carpenter STAINLESS STEEL
When You Know the SAE Specification Number
When You Know the Type Number or Analysis
To Meet a U. S. Government Specification
To Combat a Certain Type of Corrosion
To Check Required Physical Constants
To Meet Mechanical Properties at Room Temperature
To Meet Mechanical Properties at Elevated Temperatures
To Meet Mechanical Properties
Based on Their Relative Workability
For Electrical and Low Expansion Purposes
DESCRIPTION
FABRICATION
28 THR'DS P.D. .2268" .2246
.020" FLAT ON POINT
NO. 9 (TYPE 410)

Where You'll Find Answers to Your Questions about Stainless

We've taken our own experience in making Stainless—added a lot that we've learned about fabricating Stainless—and put it in this 133-page Working Data Book.

To put this book of combined experience to work for you, to get a greater number of perfect parts from every pound of Stainless you buy, call your Carpenter representative and ask for a copy of the Stainless Working Data Book. If you don't already have a copy, he'll be glad to give you one. And when you talk to him, put him to work on any special problems you may have. He knows a lot about Stainless. And he is backed up by mill men who have spent their lives digging for ways to do Stainless jobs better.

Make full use of Carpenter's service to users of Stainless. Call your nearest Carpenter office today for a copy of "Working Data for Carpenter Stainless and Heat Resisting Steels" . . . or for personal attention to a specific problem.

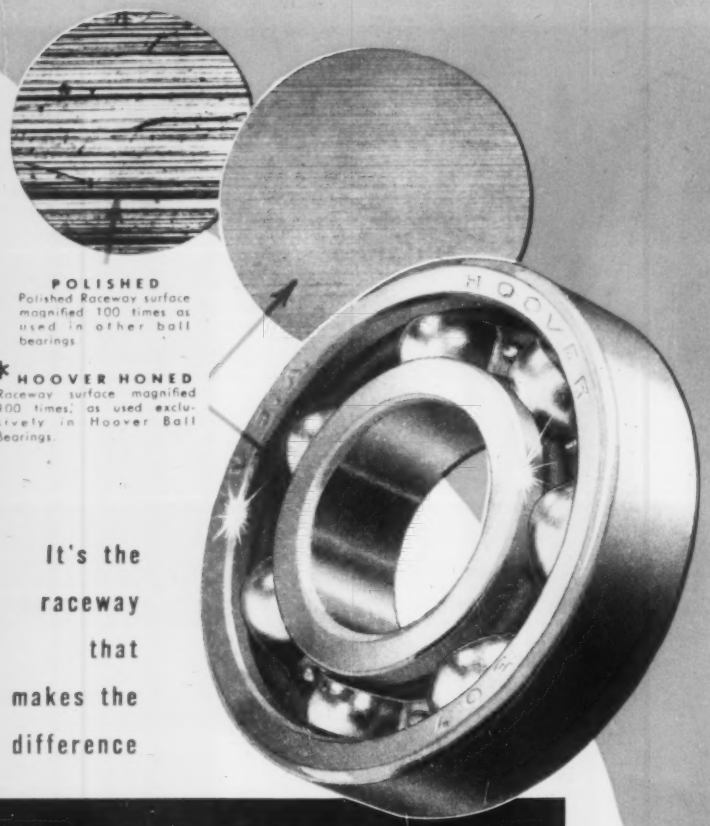
The Carpenter Steel Company, 139 W. Bern St., Reading, Pa.
Export Department: The Carpenter Steel Company, Reading, Pa. "CARSTEELCO".

Carpenter STAINLESS STEEL

takes the problems out of production

For Easy-to-Use Stainless Call Carpenter. Warehouses in principal cities throughout the country.

Nothing is as smooth as a
HOOVER HONED RACEWAY*



POLISHED
Polished Raceway surface magnified 100 times as used in other ball bearings

*HOOVER HONED
Raceway surface magnified 100 times, as used exclusively in Hoover Ball Bearings.

It's the raceway that makes the difference

HOOVER
America's only
BALL BEARING
with Honed Raceways

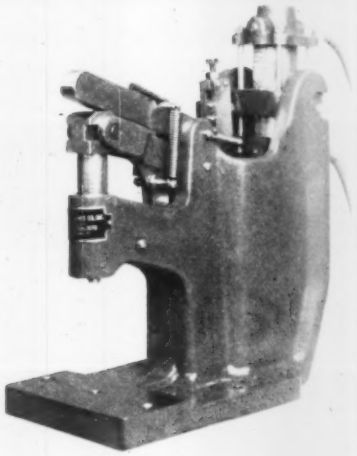
90% longer life
30% greater load
Amazing Quietness

The Aristocrat of Bearings

HOOVER BALL AND BEARING CO.
ANN ARBOR, MICHIGAN

mets, burring and pointing with platinum, tungsten or silver. Standard machine is furnished with an air foot switch but dual hand controls can be furnished at extra cost if desired.

A feature of the unit is the double-action. Spindle is constructed with a pressure pad which compresses or



assembles the work prior to staking. Weight of hammer blow is adjustable for requirements of particular jobs. The trip-dog action insures a uniform hammer blow every time, despite slight variations in stock thickness.

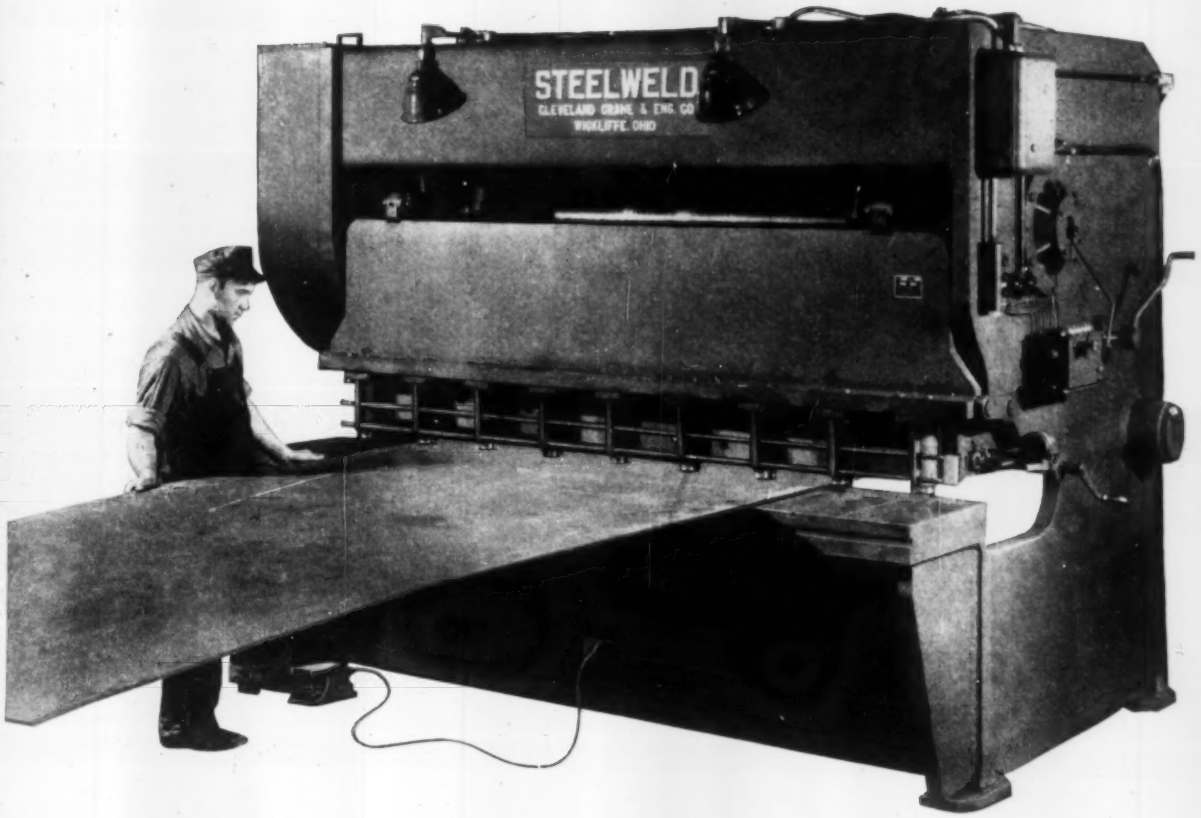
Check No. 15 on Reply Card for more Details

Variable Speed Transmission

Input speeds of 1800 and 1200 rpm without spring loading are handled by the 150 series variable speed transmission designed by Graham Transmissions Inc., 3754 N. Holton St., Milwaukee 12, Wis.

Low input speeds give cool, quiet operation with increased efficiency and great durability under the most severe continuous duty applications. Absence of spring loading makes it possible to change the speed of transmission while running or stationary. Inbuilt speed regulation provides extreme accuracy of speed holding, even under conditions of wide load variation. Inherent overload protection protects the transmission and the driven machine from damage due to overload or jam. Units are available with motor or with input shaft extension for coupling to a separate motor or belt drive from other shaft of the machine.

All sizes may be had with either standard output construction delivering speeds from 0.37 input speed to zero or with a wide variety of types and ratios of built-in gear boxes in-



ALL STEELWELD SHEARS
CONTROLLED ELECTRICALLY...

OPERATION of Steelweld Shears is unusually easy and convenient. There is no tiresome lifting of the leg to work a foot treadle. Slow, fatiguing knee action has been replaced by fast easy toe action.

A safety type electric foot switch is used. It can be slid around the floor wherever most convenient. It enables shearing speeds not attainable with foot treadles for certain cutting operations.

For instance, when cutting narrow strips from a long sheet, the operator can push the sheet at the end and control the shear at the same time. He need not be near the machine. As the sheet becomes shorter he can move the switch along with his foot to always be within easy reach.

There is no extra charge for electrical foot control on Steelweld Shears — it is standard equipment on all size machines.

Steelweld Shears are radically different from all other shears with many outstanding features. Get the facts on these truly new and modern machines. Learn about the advantages they offer you.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

7803 East 282nd Street, Wickliffe, Ohio

STEELWELD PIVOTED BLADE SHEARS

cluding single stage spur reducer, double reduction helical spur reducers, spur gear step-ups and worm gear reducers with shaft horizontal or vertical. This series is designed to use standard NEMA C flange motors of all types—open, totally enclosed and explosionproof. Dimensions are almost identical to the previous 45 series designed for 3600 rpm operation. Shaft heights and diameter are the same, width is the same and overall length is increased less than 3 inches.

Check No. 16 on Reply Card for more Details

• • •

EXACT MEASUREMENTS: High H permeameter for magnetic testing, made by Rubicon Co., Philadelphia 32, Pa., is suitable for exact measurements of normal induction, hysteresis and other characteristics of magnetic materials which require magnetizing forces up to more than 500 oersteds.

Check No. 17 on Reply Card for more Details

HARD FACING ROD: Wear-Flame 40, a centrifugally cast hard facing rod consisting of highly wear-resistant chromium carbides contained in a hard iron chromium, manganese alloy matrix, is announced by Alloy Rods Co., York, Pa. Hardness is retained at relatively high temperatures. Sizes available are in $\frac{1}{8}$-inch diameter by random lengths; $\frac{5}{32}$-inch to $\frac{3}{8}$-inch diameters by 14-inch lengths.

Check No. 18 on Reply Card for more Details

SHUT-OFF VALVE: Model LDS-2-750 direct solenoid two-way capacity shut-off valve, made by Airmatic Valve Inc., Cleveland, O., features positive seal, ports in line and only one moving part. It is constructed of cast naval bronze and is corrosion resistant throughout. Pressures range from 0 to 225 psi and it operates on alternating or direct current. Valve is available in sizes $\frac{1}{4}$-inch through 2 inches.

Check No. 19 on Reply Card for more Details

AIR SANDER: A new straight line action single-pad sander, developed by Sundstrand Machine Tool Co., Rockford, Ill., leaves no swirls or pressure marks. It operates both wet or dry. It can be worked easily over flat or curved surfaces.

Check No. 20 on Reply Card for more Details

LARGE FACE TACHOMETER: Model J-6 stationary tachometer, announced by Herman H. Sticht Co. Inc., New York, N. Y., has a 5½-inch diameter face and is of the centrifugal type, driven by flexible cable. Unit is ball bearing mounted and is unaffected by temperature or magnetic conditions. Pointer of instrument travels in clockwise direction regardless of drive shaft rotation.

Check No. 21 on Reply Card for more Details

IMPROVED DRILL JIG: Manufacturers Engineering Service, Toledo, O., offer an improved model X750 Kam-Grip drill jig. Only one bushing plate is required to accommodate a range of standard drill bushings up to 11/32-inch drill size and only one double-end anvil is needed for work stock diameters from $\frac{1}{8}$ to $\frac{3}{4}$-inch. Unit can be operated manually or automatically when actuated by a drill press spindle.

Check No. 22 on Reply Card for more Details

NO FLYING GLASS: Wilbur & Williams Co., Boston, Mass., offers Shatterbond, a clear coating applied to glass to minimize flying glass hazard and to guard against entry of dangerous radioactive dust by reducing broken apertures. It may be brushed or sprayed on the glass.

Check No. 23 on Reply Card for more Details

ADHERES TO STEEL: Atlas Mineral Products Co., Mertztown, Pa., offers Atlastic 58, a hot melt corrosion resistant plastic product. It adheres to concrete and steel and is resistant to many acids, alkalies and salts.

Check No. 24 on Reply Card for more Details

SAVES MOUNTING SPACE: Hydreco V16 series control valves, announced by Hydraulic Equipment Co., Cleveland 17, O., conserve mounting space in hydraulic controls by incorporating check valves within their control plungers and using the hollow plunger center for oil passage. Relief valves designed into the valve body also reduce space needs. They operate one to four single or double-acting cylinders in various arrangements.

Check No. 25 on Reply Card for more Details

PATCHING FOR FLOORS: An improved type of armor resurfacing and patching material for concrete floors is announced by Monroe Co. Inc., Cleveland 6, O. A new, finer aggregate has been added which is said to make it more effective as an overall floor resurfacer and to fill minute cracks in concrete floors.

Check No. 26 on Reply Card for more Details

WELDING, BRAZING ROD: All-State Welding Alloys Co. Inc., White Plains, N. Y., offers No. 3 cast iron (copper coated) welding and brazing rod. It is recommended as general purpose for both salvage and production including repairing breaks and cracks, filling blow holes and building up worn surfaces. It is applied with the company's No. 1 cast iron flux and a neutral oxyacetylene flame and does not require melting base metal.

Check No. 27 on Reply Card for more Details

HEAVY DUTY CASTERS: Heavy duty structural steel casters, series 40-A-MH (swivel) and series 41-A-MH (rigid), in 5, 6, 8 and 10-inch wheel diameters are offered by Bon Foundry & Machine Co., Manheim, Pa. The swivel casters have hardened ball races to absorb shock and eliminate king bolt strain. Both series feature wheels with roller bearings revolving on hardened and ground steel sleeves and pressure lubricated throughout.

Check No. 28 on Reply Card for more Details

TINY TACKER: A new, pocket-size tacker, introduced by Heller Co., Cleveland 14, O., staples braided, rubber-coated, single and double strand wire and hollow tube lines. Front and rear guides circle the wire and permit rapid drawing around difficult angles or corners.

Check No. 29 on Reply Card for more Details

LATHE ATTACHMENT: Du-Ona-Lathe, a vertical rotary attachment for lathes, is available from Allan Mfg. Co., Long Island City 5, N. Y. It performs diversified jobs such as drilling, reaming, flycutter facing and jig and fixture work. It will fit all 9-inch South Bend lathes with other models available for 9 and 10-inch lathes.

Check No. 30 on Reply Card for more Details

ROTARY SELECTOR SWITCH: A new rotary selector switch, announced by Leeds & Northrup Co., Philadelphia 44, Pa., for use in instrument circuits has solid silver contacts and totally enclosed construction. Brushes are multiple-leaf, self-aligning and made of durable silver alloy. Various switching combinations are supplied.

Check No. 31 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

The Market Outlook

CONFUSION is increasing in the distribution of steel. Emergency needs are mounting so rapidly many trade authorities are convinced a Controlled Materials Plan, such as that used so effectively in World War II, can't come too soon. Special directives are beginning to pile up on other emergency ratings. In turn, these are piling up on still others. All of which make it difficult for producers and consumers to know where they stand in relation to supply.

RATINGS— Mill delivery promises on DO ratings now extend well into third quarter; in numerous instances beyond. Some are so far ahead they are of little use for various critical requirements. Consequently, special directives are appearing. The resulting pileup of tonnage on mill books not only is cutting severely into supplies for the civilian goods market, but DO ratings are beginning to mean little more than "hunting licenses." Worse still, the situation is likely to deteriorate rapidly from here on with armament production expanding.

PATTERN—Current supply difficulties pretty much follow the pattern in the early stages of World War II. Distribution at that time got so badly fouled up the priorities system had to be dropped entirely in favor of the Controlled Materials Plan before order could be re-established in mill scheduling and shipping. Government control authorities are cognizant of the difficulties of those days and, anxious to avoid a similar situation in the present emergency, are driving hard to get a CMP in operation by July 1.

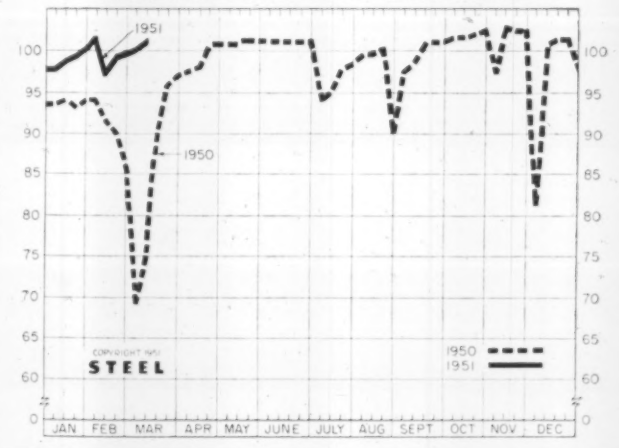
SUPPLIES—Although ingot steel is pouring from mills at a rate of over 100 million tons a year, an increasing supply shortage is indicated. Just how short production will fall under 1951 requirements is uncertain. One authoritative estimate is that total requirements of finished steel this year will top output by at least 15 million tons. This is based on possible production of 75 million tons against estimated total demand of 91 million. Military orders are expected to require about 15 million tons, essential needs about 31 million, and, based on 1950 experience, other civilian consumption including plant expansion, about 45 million tons.

CUTBACKS—Steady deterioration of supply conditions is necessitating additional cutbacks in tonnage to consumer durable goods manufacturers. Beginning in April steel for such uses is cut back 20 per cent below average quarterly consumption in first half of 1950. At the same time manufacturers cannot circumvent the cutback by purchasing parts formerly made by themselves, and, further, those using conversion steel must continue using it. The National Production Authority's latest regulations exempt manufacturers who used no more than 100 tons per quarter in the base period. This is designed to aid small business obtain sufficient metal to keep in operation. Additional cutbacks loom for third quarter with the military load rising.

PRODUCTION—For the third time in history the steel mills produced more than 2 million tons last week. Estimated national ingot rate rose 1 point to 101 per cent of capacity. Increased production at several points more than offset a drop in the Birmingham district occasioned by a strike of ore miners.

PRICES— Frozen by government order, steel and related prices are firmly pegged at January levels. STEEL's weighted index on finished steel holds at 171.92, the arithmetical composite at $106.32, No. 2 foundry pig iron at $52.54, basic pig iron at $52.16, and malleable pig iron at $53.27. Steelmaking scrap composite is steady at $44.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended Mar. 10	Change	Same Week 1950	Same Week 1949
Pittsburgh	101	0	61.5	99.5
Chicago	104.5	+1	84.5	100.5
Eastern Pa.	99.5	0	72	98
Youngstown	106	+5	50	105
Wheeling	96	0	60	95
Cleveland	103	+1	99	102
Buffalo	104	0	98.5	104
Birmingham	78	−22	42	100
New England	90	0	80	87
Cincinnati	102	+1	85	99
St. Louis	95	+8	84.5	82.5
Detroit	106	+2	104	106
Western	103.5	+2	81	100.5
Estimated national rate	101	+1	74.5	100.5

Based on weekly steelmaking capacity of 1,999,634 tons for 1951; 1,928,721 tons for second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949.

* Change from revised rate for preceding week.

The Metalworking Outlook—p. 43 Production-Engineering News—p. 79

Composite Market Averages

	Mar. 8 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av. = 100)	171.92	171.92	171.92	156.13	111.62
Index in cents per lb.	4.657	4.657	4.657	4.230	3.024
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$106.32	$106.32	$106.32	$93.18	$63.54
No. 2 Fdry, Pig Iron, GT	52.54	52.54	52.54	46.47	25.42
Basic Pig Iron, GT	52.16	52.16	52.16	45.97	24.75
Malleable Pig Iron, GT	53.27	53.27	53.27	47.27	26.04
Steelmaking Scrap, GT	44.00	44.00	44.00	27.50	19.17

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 5-year base period 1935-39. Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Mar. 8 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	3.70	3.70	3.70	3.45	2.50
Bars, H.R., Chicago	3.70	3.70	3.70	3.45	2.50
Bar, H.R., del. Philadelphia	4.18	4.18	4.18	3.93	2.82
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.10–15	3.10
Shapes, Std., Pittsburgh	3.65	3.65	3.65	3.40	2.35
Shapes, Std., Chicago	3.65	3.65	3.65	3.40	2.35
Shapes, del. Philadelphia	3.90	3.90	3.90	3.46	2.465
Plates, Pittsburgh	3.70	3.70	3.70	3.50	2.50
Plates, Chicago	3.70	3.70	3.70	3.50	2.50
Plates, Coatesville, Pa.	4.15	4.15	4.15	3.60	2.50
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.50	2.50
Plates, Claymont, Del.	4.15	4.15	4.15	3.60	2.50
Sheets, H.R., Pittsburgh	3.60–75	3.60–75	3.60–75	3.35	2.425
Sheets, H.R., Chicago	3.60	3.60	3.60	3.35	2.425
Sheets, C.R., Pittsburgh	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Chicago	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Detroit	4.55	4.55	4.55	4.30	3.375
Sheets, Galv., Pittsburgh	4.80	4.80	4.80	4.40	4.05
Strip, H.R., Pittsburgh	3.75–4.00	3.75–4.00	3.75–4.00	3.25	2.35
Strip, H.R., Chicago	3.50	3.50	3.50	3.25	2.35
Strip, C.R., Pittsburgh	4.65–5.35	4.65–5.35	4.65–5.35	4.15	3.05
Strip, C.R., Chicago	4.90	4.90	4.90	4.30	3.15
Strip, C.R., Detroit	4.35–5.60	4.35–5.60	4.35–5.60	4.35–40	3.15
Wire, Basic, Pittsburgh	4.85–5.10	4.85–5.10	4.85–5.10	4.50	3.05
Nails, Wire, Pittsburgh	5.90–6.20	5.90–6.20	5.90–6.20	5.30	3.25
Tin plate, box, Pittsburgh	$8.70	$8.70	$8.70	$7.50	$5.25

SEMIFINISHED

Billets, forging, Pitts. (NT)	$66.00	$66.00	$66.00	$63.00	$47.00
Wire rods, $\frac{7}{32}$-$\frac{9}{32}$", Pitts.	4.10–30	4.10–30	4.10–30	3.85	2.30

PIG IRON, Gross Ton

Bessemer, Pitts.	$53.00	$53.00	$53.00	$47.00	$26.25
Basic, Valley	52.00	52.00	52.00	46.00	25.25
Basic, del. Phila.	56.39	56.39	56.39	49.44	27.09
No. 2 Fdry, Pitts.	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Chicago	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Valley	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Del. Phila.	56.89	56.89	56.89	49.94	27.59
No. 2 Fdry, Birm.	48.88	48.88	48.88	42.38	22.13
No. 2 Fdry (Birm.) del. Cin.	55.58	55.58	55.58	49.08	25.81
Malleable, Valley	52.50	52.50	52.50	46.50	25.75
Malleable, Chicago	52.50	52.50	52.50	46.50	25.75
Charcoal, Lyles, Tenn.	66.00	66.00	66.00	60.00	33.00
Ferromanganese, Etna, Pa.	188.00	188.00	188.00	175.00	140.00*

* Delivered, Pittsburgh.

SCRAP, Gross Ton (including broker's commission)

No. 1 Heavy Melt, Pitts.	$45.00	$45.00	$45.00	$31.00	$20.00
No. 1 Heavy Melt, E. Pa.	43.50	43.50	43.50	23.50	18.75
No. 1 Heavy Melt, Chicago	43.50	43.50	43.50	27.50	18.75
No. 1 Heavy Melt, Valley	45.00	45.00	45.00	31.75	20.00
No. 1 Heavy Melt, Cleve.	44.00	44.00	44.00	28.25	19.50
No. 1 Heavy Melt, Buffalo	44.00	44.00	44.00	28.25	19.25
Rails, Rerolling, Chicago	52.50	52.50	52.50	40.50	22.25
No. 1 Cast, Chicago	49.00*	49.00*	49.00*	41.00	20.00

* F.o.b. shipping point.

COKE, Net Ton

Beehive, Furn., Connlsvl.	$14.75	$14.75	$14.75	$13.25	$7.50
Beehive, Fdry., Connlsvl.	17.50	17.50	17.50	15.50	8.25
Oven Fdry., Chicago	21.00	21.00	21.00	21.00	13.00

NONFERROUS METALS

Copper, del. Conn.	24.50	24.50	24.50	18.50	12.00
Zinc, E. St. Louis	17.50	17.50	17.50	9.75	8.25
Lead, St. Louis	16.80	16.80	16.80	11.80	6.35
Tin, New York	140.00	182.00	182.50	74.125	52.00
Aluminum, del.	19.00	19.00	19.00	17.00	15.00
Antimony, Laredo, Tex.	42.00	42.00	42.00	24.50	14.50
Nickel, refinery, duty paid	50.50	50.50	50.50	40.00	35.00

Pig Iron

F.o.b. furnace prices quoted under GCPR as reported to STEEL. Minimum delivered prices do not include 3% federal tax. Key to producing companies published on following two pages.

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$54.00	$54.50	$55.00	$55.50
Brooklyn,N.Y.,del.	....	58.79	59.29	....
Newark,del.	56.63	57.13	57.63	58.13
Philadelphia,del.	56.39	56.89	57.39	57.89
Birmingham District				
AlabamaCity,Ala. R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward,Ala. W15	48.38	48.88	....	....
Cincinnati,del.	....	55.58	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda,N.Y. W12	52.00	52.50	53.00	....
No.Tonawanda,N.Y. T9	....	52.50	53.00	....
Boston,del.	61.26	61.76	62.20	....
Rochester,N.Y.,del.	54.63	55.13	55.63	....
Syracuse,N.Y.,del.	55.58	56.08	56.58	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary,Ind. U5	52.00	....	52.50	....
IndianaHarbor,Ind. I-2	52.00	....	52.50	....
So.Chicago,Ill. W14	52.00	52.50	52.50	....
So.Chicago,Ill. Y1	52.00	52.50	52.50	....
So.Chicago,Ill. U5	52.00	....	52.50	53.00
Milwaukee,del.	53.89	54.39	54.39	54.89
Muskegon,Mich.,del.	....	57.98	57.98	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, del. from Cleve.	54.39	54.89	54.89	54.39
Lorain,O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie,Pa. I-3	52.00	52.50	52.50	53.00
Everett,Mass. E1	....	53.25	53.75	....
Fontana,Calif. K1	58.00	58.50	....	....
Geneva,Utah G4	52.00	52.50	....	....
Seattle,Tacoma,Wash.,del.	....	60.20	....	....
Portland,Oreg.,del.	....	60.20	....	....
LosAngeles,SanFrancisco,del.	59.70	60.20	....	....
GraniteCity,Ill. K7	53.90	54.40	54.90	....
St.Louis,del. (inc. tax)	54.65	55.15	55.65	....
Ironton,Utah C11	52.00	52.50	....	....
BoneStar,Tex. L6	48.00	*48.50	48.50	....
Minnequa,Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
NevilleIsland,Pa. P6	....	52.50	52.50	53.00
Pitts.,N.&S. sides, Ambridge, Aliquippa,del.	....	53.69	53.69	54.19
McKeesRocks,del.	....	53.45	53.45	53.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	....	53.94	53.94	54.44
Verona,del.	....	54.40	54.40	54.90
Brackenridge,del.	....	54.63	54.63	55.13
Bessemer,Pa. U5	52.00	....	52.50	53.00
Clairton,Rankin,So.Duquesne,Pa. U5	52.00	....	....	....
McKeesport,Pa. N3	52.00	....	....	53.00
Monessen,Pa. P7	54.00	....	....	....
Sharpsville,Pa. S6	....	....	52.50	53.00
Steelton,Pa. B2	54.00	54.50	55.00	55.50
Swedeland,Pa. A3	56.00	56.50	57.00	57.50
Toledo,O. I-3	52.00	52.50	52.50	53.00
Cincinnati,del.	57.01	57.51	....	....
Troy,N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard,O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Youngstown U5	52.00	....	....	53.00
Mansfield,O.,del.	56.26	56.76	56.76	57.26

* Low phos, southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson,O. G2, J1	$62.50
Buffalo H1	63.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

NiagaraFalls,N.Y. P15	$93.00
Keokuk,Iowa, Openhearth & Fdry. frt. allowed K2	92.50
Keokuk, OH & Fdry., 12½ lb piglets, 16% Si, frt. allowed K2	96.50
Wenatchee, Wash., O.H. & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$66.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.00
Steelton,Pa. B2	60.00
Philadelphia delivered	63.00
Troy,N.Y. R2	60.00

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Semifinished and Finished Steel Products

Mill prices quoted under GCPR as reported to STEEL, Mar. 8, 1951; cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Fontana, Calif. K1 ....$79.00
Monessen, Pa. U5 ....52.00

INGOTS, Alloy (NT)
Bethlehem, Pa. R7 ....$54.00
Fontana, Calif. K1 ....80.00
Houston, Tex. S5 ....62.00
Midland, Pa. C18 ....54.00
Monessen, Pa. U5 ....54.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer, Pa. U5 ....$56.00
Clairton, Pa. U5 ....56.00
Ellwood, Ala. T2 ....56.00
Fairfield, Ala. T2 ....56.00
Fontana, Calif. K1 ....75.00
Gary, Ind. U5 ....56.00
Johnstown, Pa. B2 ....56.00
LaFayanna, N.Y. B2 ....56.00
Munhall, Pa. U5 ....56.00
So. Chicago, Ill. U5 ....56.00
So. Duquesne, Pa. U5 ....56.00

Carbon, Forging (NT)
Bessemer, Pa. U5 ....$66.00
Buffalo R2 ....66.00
Canton, O. R2 ....66.00
Clairton, Pa. U5 ....66.00
Cleveland R2 ....66.00
Conshohocken, Pa. A3 ....73.00
Detroit R7 ....69.00
Ensley, Ala. T2 ....66.00
Fairfield, Ala. T2 ....66.00
Fontana, Calif. K1 ....85.00
Gary, Ind. U5 ....66.00
Geneva, Utah G1 ....66.00
Houston, Tex. S5 ....74.00
Johnstown, Pa. B2 ....66.00
Lackawanna, N.Y. B2 ....66.00
Los Angeles B3 ....85.00
Munhall, Pa. U5 ....66.00
Seattle B3 ....85.00
So. Chicago R2, U5, W14 ....66.00
So. Duquesne, Pa. U5 ....66.00
So. San Francisco B3 ....85.00

Alloy, Forging (NT)
Bethlehem, Pa. B2 ....$70.00
Buffalo R2 ....70.00
Canton, O. R2 ....70.00
Canton, O. (29) T7 ....66.00
Conshohocken, Pa. A3 ....77.00
Detroit R7 ....73.00
Fontana, Calif. K1 ....89.00
Gary, Ind. U5 ....70.00
Houston, Tex. S5 ....78.00
Ind. Harbor, Ind. Y1 ....70.00
Johnstown, Pa. B2 ....70.00
Lackawanna, N.Y. B2 ....70.00
Los Angeles B3 ....90.00
Massillon, O. R2 ....70.00
Midland, Pa. C18 ....70.00
Munhall, Pa. U5 ....70.00
So. Chicago R2, U5, W14 ....70.00
So. Duquesne, Pa. U5 ....70.00
Struthers, O. Y1 ....70.00
Warren, O. C17 ....70.00

ROUNDS, SEAMLESS TUBE (NT)
Canton, O. R2 ....$82.00
Cleveland R2 ....82.00
Fontana, Calif. K1 ....103.00
Gary, Ind. U5 ....82.00
Massillon, O. R2 ....82.00
So. Chicago, Ill. R2 ....82.00
So. Duquesne, Pa. U5 ....82.00

SHEET BARS (NT)
Fontana, Calif. K1 ....$89.00

SKELP
Aliquippa, Pa. J5 ....3.45
Munhall, Pa. U5 ....3.35
Warren, O. R2 ....3.35
Youngstown R2, U5 ....3.35

WIRE RODS
Alabama City, Ala. R2 ....4.10
Buffalo W12 ....4.10
Cleveland A7 ....4.10
Donora, Pa. A7 ....4.10
Fairfield, Ala. T2 ....4.10
Fontana, Calif. K1 ....4.90
Houston, Tex. S5 ....4.50
Johnstown, Pa. B2 ....4.10
Joliet, Ill. A7 ....4.10
Los Angeles B3 ....4.90
Minnequa, Colo. C10 ....4.35
Monessen, Pa. P7 ....4.30
No. Tonawanda, N.Y. B11 ....4.10
Pittsburg, Calif. C11 ....4.75
Portsmouth, O. P12 ....4.30
Roebling, N.J. R5 ....4.20
So. Chicago, Ill. R2 ....4.10
Sparrows Point, Md. B2 ....4.20
Sterling, Ill. (1) N15 ....4.10
Struthers, O. Y1 ....4.10
Torrance, Calif. C11 ....4.90
Worcester A7 ....4.40

PLATES, Wrought Iron
Economy, Pa. B14 ....8.60

STRUCTURALS
Carbon Steel Stand. Shapes
Alabama City, Ala. R2 ....3.60
Aliquippa, Pa. J5 ....3.65
Bessemer, Ala. T2 ....3.65
Bethlehem, Pa. B2 ....3.70
Clairton, Pa. U5 ....3.65
Fairfield, Ala. T2 ....3.65
Fontana, Calif. K1 ....4.25
Gary, Ind. U5 ....3.65
Geneva, Utah G1 ....3.65
Houston, Tex. S5 ....4.05
Ind. Harbor, Ind. I-2 ....3.65
Johnstown, Pa. B2 ....3.70
Kansas City, Mo. S5 ....4.25
Lackawanna, N.Y. B2 ....3.70
Los Angeles B3 ....4.25
Minnequa, Colo. C10 ....4.10
Munhall, Pa. U5 ....3.65
Niles, Calif. (22) P1 ....4.85
Phoenixville, Pa. P4 ....4.95
Portland, Oreg. O4 ....4.50
Seattle B3 ....4.30
So. Chicago, Ill. U5, W14 ....3.65
So. San Francisco B3 ....4.20
Torrance, Calif. C11 ....4.25
Weirton, W.Va. W6 ....3.90

Alloy Stand. Shapes
Clairton, Pa. U5 ....4.35
Fontana, Calif. K1 ....5.55
Munhall, Pa. U5 ....4.35
So. Chicago, Ill. U5 ....4.35

H.S., L.A. Stand. Shapes
Aliquippa, Pa. J5 ....5.50
Bessemer, Ala. T2 ....5.50
Bethlehem, Pa. (14) B2 ....5.50
Clairton, Pa. U5 ....5.50
Fairfield, Ala. T2 ....5.50
Fontana, Calif. K1 ....6.10
Gary, Ind. U5 ....5.50
Geneva, Utah G1 ....5.50
Ind. Harbor, Ind. I-2 ....5.50
Ind. Harbor, Ind. Y1 ....6.00
Johnstown, Pa. B2 ....5.50
Lackawanna, N.Y. (14) B2 ....5.50
Los Angeles B3 ....6.05
Munhall, Pa. U5 ....5.50
Seattle B3 ....6.10
So. Chicago, Ill. U5 ....5.50
So. San Francisco B3 ....6.00
Struthers, O. Y1 ....6.00

Wide Flange
Bethlehem, Pa. B2 ....3.70
Clairton, Pa. U5 ....3.65
Fontana, Calif. K1 ....4.65
Lackawanna, N.Y. B2 ....3.70
Munhall, Pa. U5 ....3.65
So. Chicago, Ill. U5 ....3.65

H.S., L.A. Wide Flange
Bethlehem, Pa. B2 ....5.50
Lackawanna, N.Y. B2 ....5.50
Munhall, Pa. U5 ....5.45
So. Chicago, Ill. U5 ....5.45

SHEET STEEL PILING
Ind. Harbor, Ind. I-2 ....4.45
Lackawanna, N.Y. B2 ....4.45
Munhall, Pa. U5 ....4.45
So. Chicago, Ill. U5 ....4.45

BEARING PILES
Munhall, Pa. U5 ....3.65
So. Chicago, Ill. U5 ....3.65

PLATES, High-Strength Low-Alloy
Aliquippa, Pa. J5 ....5.65
Bessemer, Ala. T2 ....5.65
Clairton, Pa. U5 ....5.65
Cleveland J5, R2 ....5.65
Conshohocken, Pa. A3 ....5.90
Fairfield, Ala. T2 ....5.65
Fontana, Calif. (30) K1 ....6.25
Gary, Ind. U5 ....5.65
Geneva, Utah G1 ....5.65
Ind. Harbor, Ind. I-2 ....5.65
Ind. Harbor, Ind. Y1 ....6.15
Johnstown, Pa. B2 ....5.65
Munhall, Pa. U5 ....5.65
Pittsburgh J5 ....5.65
Seattle B3 ....6.55
Sharon, Pa. S3 ....5.70
So. Chicago, Ill. U5 ....5.65
Sparrows Point, Md. B2 ....5.65
Warren, O. R2 ....5.65
Youngstown Y1 ....6.15

PLATES, Open-Hearth Alloy
Claymont, Del. W16 ....4.85
Coatesville, Pa. L7 ....5.25
Conshohocken, Pa. A3 ....5.05
Fontana, Calif. K1 ....5.70
Gary, Ind. U5 ....4.75
Johnstown, Pa. B2 ....4.75
Munhall, Pa. U5 ....4.75
Sharon, Pa. S3 ....5.20
So. Chicago, Ill. U5 ....4.75
Sparrows Point, Md. B2 ....4.75

FLOOR PLATES
Cleveland J5 ....4.75
Conshohocken, Pa. A3 ....4.75
Harrisburg, Pa. C5 ....5.95
Ind. Harbor, Ind. I-2 ....4.75
Munhall, Pa. U5 ....4.75
So. Chicago, Ill. U5 ....4.75

PLATES, Carbon Steel
Alabama City, Ala. R2 ....3.70
Aliquippa, Pa. J5 ....3.70
Ashland, Ky. (15) A10 ....3.70
Bessemer, Ala. T2 ....3.70
Clairton, Pa. U5 ....3.70
Claymont, Del. W16 ....4.15
Cleveland J5, R2 ....3.70
Coatesville, Pa. L7 ....4.15
Conshohocken, Pa. A3 ....4.15
Fairfield, Ala. T2 ....3.70
Fontana, Calif. (30) K1 ....4.30
Gary, Ind. U5 ....3.70
Granite City, Ill. G4 ....4.40
Geneva, Utah G1 ....3.70
Harrisburg, Pa. C5 ....4.95
Houston, Tex. S5 ....4.10
Ind. Harbor, Ind. I-2, Y1 ....3.70
Johnstown, Pa. B2 ....3.70
Lackawanna, N.Y. B2 ....3.70
Minnequa, Colo. C10 ....4.50
Munhall, Pa. U5 ....3.70
Pittsburgh J5 ....3.70
Seattle B3 ....4.60
Sharon, Pa. S3 ....3.95
So. Chicago, Ill. U5, W14 ....3.70
Sparrows Point, Md. B2 ....3.70
Steubenville, O. W10 ....3.70
Warren, O. R2 ....3.70
Weirton, W.Va. W6 ....4.00
Youngstown R2, U5, Y1 ....3.70

PLATES, Carbon A. R.
Fontana, Calif. K1 ....5.45
Geneva, Utah G1 ....4.85

PLATES, Ingot Iron
Ashland, c.l. (15) A10 ....3.95
Ashland, lcl. (15) A10 ....4.45
Cleveland, c.l. R2 ....4.30
Warren, O. c.l. R2 ....4.30

BARS, Hot-Rolled Carbon
Alabama City, Ala. R2 ....3.70
Aliquippa, Pa. J5 ....3.70
Alton, Ill. (1) L1 ....3.95
Atlanta, Ga. A11 ....4.25
Bessemer, Ala. T2 ....3.70
Buffalo R2 ....3.70
Canton, O. R2 ....3.70
Clairton, Pa. U5 ....3.70
Cleveland R2 ....3.70
Detroit R7 ....3.85
Emeryville, Calif. J7 ....4.45
Fairfield, Ala. T2 ....3.70
Fontana, Calif. K1 ....4.40
Gary, Ind. U5 ....3.70
Houston, Tex. S5 ....4.10
Ind. Harbor, Ind. I-2, Y1 ....3.70
Johnstown, Pa. B2 ....3.70
Kansas City, Mo. S5 ....4.30
Lackawanna, N.Y. B2 ....3.70
Los Angeles B3 ....4.40
Milton, Pa. B6 ....4.20
Minnequa, Colo. C10 ....4.15
Niles, Calif. P1 ....5.05
N. Tonawanda, N.Y. B11 ....3.70
Pittsburg, Calif. C11 ....4.40
Pittsburgh J5 ....3.70
Portland, Oreg. O4 ....4.65
Seattle B3, N14 ....4.45
So. Chicago R2, U5, W14 ....3.70
So. Duquesne, Pa. U5 ....3.70
So. San Fran., Cal. B3 ....4.45
Struthers, O. Y1 ....3.70
Torrance, Calif. C11 ....4.40
Weirton, W.Va. W6 ....3.85
Youngstown R2, U5 ....3.70

BAR SIZE ANGLES; S. SHAPES
Aliquippa, Pa. J5 ....3.70
Atlanta A11 ....4.25
Johnstown, Pa. B2 ....3.70
Lackawanna, N.Y. B2 ....3.70
Niles, Calif. P1 ....5.05
Portland, Oreg. O4 ....4.65
San Francisco S7 ....4.85

BAR SIZE ANGLES; H.R. CARBON
Bethlehem, Pa. B2 ....3.90

BARS, Hot-Rolled Alloy
Bethlehem, Pa. B2 ....4.30
Buffalo R2 ....4.30
Canton, O. R2 ....4.30
Canton, O. (29) T7 ....3.95
Clairton, Pa. U5 ....4.30
Detroit R7 ....4.45
Ecorse, Mich. G5 ....4.65
Fontana, Calif. K1 ....5.35
Gary, Ind. U5 ....4.30
Houston, Tex. S5 ....4.70
Ind. Harbor, Ind. I-2, Y1 ....4.30
Johnstown, Pa. B2 ....4.30
Kansas City, Mo. S5 ....4.90
Lackawanna, N.Y. B2 ....4.30
Los Angeles B3 ....5.35
Massillon, O. R2 ....4.30
Midland, Pa. C18 ....4.30
So. Chicago R2, U5, W14 ....4.30
So. Duquesne, Pa. U5 ....4.30
Struthers, O. Y1 ....4.30
Warren, O. C17 ....4.30
Youngstown U5 ....4.30

BAR SHAPES, Hot-Rolled Alloy
Clairton, Pa. U5 ....4.55
Gary, Ind. U5 ....4.55
Youngstown U5 ....4.55

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa, Pa. J5 ....5.55
Bessemer, Ala. T2 ....5.55
Bethlehem, Pa. B2 ....5.55
Clairton, Pa. U5 ....5.55
Cleveland R2 ....5.55
Fairfield, Ala. T2 ....5.55
Fontana, Calif. K1 ....6.60
Gary, Ind. U5 ....5.55
Ind. Harbor, Ind. I-2 ....5.55
Indiana Harbor, Ind. Y1 ....6.05
Johnstown, Pa. B2 ....5.55
Lackawanna, N.Y. B2 ....5.55
Los Angeles B3 ....6.25
Pittsburgh J5 ....5.55
Seattle B3 ....6.30
So. Duquesne, Pa. U5 ....5.55
So. San Francisco B3 ....6.30
Struthers, O. Y1 ....6.05
Youngstown U5 ....5.55

BARS, Cold-Finished Carbon
Ambridge, Pa. W18 ....4.55
Beaver Falls, Pa. M12, R2 ....4.55
Buffalo B5 ....4.60
Camden, N.J. P13 ....5.00
Carnegie, Pa. C12 ....4.55
Chicago W18 ....4.55
Cleveland A7, C20 ....4.55
Detroit P17 ....4.70
Donora, Pa. A7 ....4.55
Elyria, O. W8 ....4.55
Franklin Park, Ill. N5 ....4.55
Gary, Ind. R2 ....4.55
Green Bay, Wis. F7 ....4.55
Hammond, Ind. I-2, M13 ....4.55
Hartford, Conn. R2 ....5.10
Harvey, Ill. B5 ....4.55
Los Angeles R2 ....6.00
Mansfield, Mass. B5 ....5.10
Massillon, O. R2, R8 ....4.55
Monaca, Pa. S17 ....4.55
Newark, N.J. W18 ....5.00
Plymouth, Mich. P5 ....4.80
Pittsburgh J5 ....4.55
Putnam, Conn. W18 ....5.10
Readville, Mass. C14 ....5.10
St. Louis, Mo. M5 ....4.95
So. Chicago, Ill. W14 ....4.55
Spring City, Pa. (5) K3 ....5.00
Struthers, O. Y1 ....4.55
Waukegan, Ill. A7 ....4.55
Youngstown F3, Y1 ....4.55

BARS, Cold-Finished Alloy
Ambridge, Pa. W18 ....5.40
Beaver Falls, Pa. M12 ....5.40
Bethlehem, Pa. B2 ....5.40
Buffalo B5 ....5.40
Camden, N.J. P13 ....5.80
Canton, O. R2 ....5.40
Canton O. (29) T7 ....4.90
Carnegie, Pa. C12 ....5.40
Chicago W18 ....5.40
Cleveland A7 ....5.45
Cleveland C20 ....5.40
Detroit P17 ....5.55
Donora, Pa. A7 ....5.45
Elyria, O. W8 ....5.40
Gary, Ind. R2 ....5.40
Hammond, Ind. I-2, M13 ....5.40
Hartford, Conn. R2 ....5.85
Harvey, Ill. B5 ....5.40
Lackawanna, N.Y. B2 ....5.40
Mansfield, Mass. B5 ....5.85
Massillon, O. R2, R8 ....5.40
Midand, Pa. C18 ....5.40
Monaca, Pa. S17 ....5.40
Newark, N.J. W18 ....5.75
Plymouth, Mich. P5 ....5.60
So. Chicago, Ill. R2, W14 ....5.40
Struthers, O. Y1 ....5.40
Warren, O. C17 ....5.40
Waukegan, Ill. A7 ....5.45
Worcester, Mass. A7 ....5.75
Youngstown F3, Y1 ....5.40

RAIL STEEL BARS
Chicago Hts. (3, 4) I-2, C2 ....4.75
Franklin, Pa. (3, 4) F5 ....4.75
Fort Worth, Tex. (26) T4 ....5.40
Huntngtn, W.Va. (3) W7 ....5.50
Marion, O. (3) P11 ....4.75
Moline, Ill. (3) R2 ....3.80
Tonawanda (3, 4) B12 ....4.75
Williamsport (3) S19 ....5.00
Williamsport (4) S19 ....5.10

BARS, Wrought Iron
Dover, N.J. (Staybolt) U1 ....15.00
Dover, (Eng. Bolt) U1 ....13.50
Dover (Wrgt. Iron) U1 ....12.25
Economy, Pa. (S.R.) B14 ....9.60
Economy, Pa. (D.R.) B14 ....11.90
Economy (Staybolt) B14 ....12.20
McK. Rks. (Staybolt) L5 ....14.50
McK. Rks. (S.R.) L5 ....9.60
McK. Rks. (D.R.) L5 ....13.00

BARS, Reinforcing (Fabricators)
Alabama City, Ala. R2 ....3.70
Alton, Ill. (6) L1 ....3.70
Atlanta A11 ....4.25
Buffalo R2 ....3.70
Cleveland R2 ....3.70
Emeryville, Calif. J7 ....4.45
Fairfield, Ala. T2 ....3.70
Fontana, Calif. K1 ....4.40
Gary, Ind. U5 ....3.70
Houston, Tex. S5 ....4.10
Ind. Harbor, Ind. I-2, Y1 ....3.70
Johnstown, Pa. B2 ....3.70
Kansas City, Mo. S5 ....4.30
Lackawanna, N.Y. B2 ....3.70
Los Angeles B3 ....4.40
Milton, Pa. B6 ....4.20
Minnequa, Colo. C10 ....4.50
Niles, Calif. P1 ....5.05
Pittsburg, Calif. C11 ....4.40
Pittsburgh J5 ....3.70
Portland, Oreg. O4 ....4.65
Seattle B3 ....4.60
So. Chicago, Ill. R2 ....3.70
So. Duquesne, Pa. U5 ....3.70
So. San Francisco B3 ....4.45
Sparrows Point, Md. B2 ....3.70
Struthers, O. Y1 ....3.70
Torrance, Calif. C11 ....4.40
Youngstown R2, U5, Y1 ....3.70

BARS, Reinforcing (Fabricated; to Consumers)
Huntington, W.Va. W7 ....5.50
Johnstown, ¾-1" B2 ....4.75
Los Angeles B3 ....5.45
Marion, O. P11 ....5.00
Seattle B3, N14 ....5.55
So. San Francisco B3 ....5.45
Sparrows Pt. ¾-1" B2 ....4.75
Williamsport, Pa. S19 ....5.10

SHEETS, Hot-Rolled Steel
(18 gage and heavier)
Alabama City, Ala. R2 ....3.60
Ashland, Ky. (8) A10 ....3.60
Butler, Pa. A10 ....3.60
Cleveland J5, R2 ....3.60
Conshohocken, Pa. A3 ....4.00
Detroit M1 ....4.40
Ecorse, Mich. (8) G5 ....3.80
Fairfield, Ala. T2 ....3.60
Fontana, Calif. K1 ....4.55
Gary, Ind. U5 ....3.60
Geneva, Utah G1 ....3.70
Granite City, Ill. G4 ....4.30
Ind. Harbor, Ind. I-2, Y1 ....3.60
Irvin, Pa. U5 ....3.60
Lackawanna, N.Y. B2 ....3.60
Munhall, Pa. U5 ....3.60
Niles, O. N12 ....5.25
Pittsburg, Calif. C11 ....4.30
Pittsburgh J5 ....3.60
Sharon, Pa. S3 ....4.00
So. Chicago, Ill. W14 ....3.60
Sparrows Point, Md. B2 ....3.60
Steubenville, O. W10 ....3.60
Torrance, Calif. C11 ....4.30
Warren, O. R2 ....3.60
Weirton, W.Va. W6 ....3.60
West Leechburg, Pa. A4 ....3.75
Youngstown U5, Y1 ....3.60

SHEETS, H.R. (19 gage)
Alabama City, Ala. R2 ....4.75
Dover, O. R1 ....5.65
Ind. Harbor, Ind. I-2 ....5.40
Mansfield, O. E6 ....5.65
Niles, O. N12 ....5.75
Torrance, Calif. C11 ....5.40

SHEETS, H.R (14-ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 ....5.40
Conshohocken, Pa. A3 ....5.65
Ecorse, Mich. G5 ....5.95
Fairfield, Ala. T2 ....5.40
Fontana, Calif. K1 ....6.35
Gary, Ind. U5 ....5.40
Ind. Harbor, Ind. I-2 ....5.40
Indiana Harbor, Ind. Y1 ....5.90
Irvin, Pa. U5 ....5.40
Lackawanna (35) B2 ....5.40
Pittsburgh J5 ....5.40
Sharon, Pa. S3 ....5.40
So. Chicago, Ill. U5 ....5.40
Sparrows Point (36) B2 ....5.40
Warren, O. R2 ....5.40
Weirton, W.Va. W6 ....5.75
Youngstown U5 ....5.40
Youngstown Y1 ....5.90

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 ....6.55
Ecorse, Mich. G5 ....7.10
Fontana, Calif. K1 ....7.50
Gary, Ind. U5 ....6.55
Indiana Harbor, Ind. Y1 ....7.06
Indiana Harbor, Ind. I-2 ....6.55
Irvin, Pa. U5 ....6.55
Lackawanna (37) B2 ....6.55
Pittsburgh J5 ....6.55
Sparrows Point (38) B2 ....6.55
Warren, O. R2 ....6.55
Weirton, W.Va. W6 ....6.90
Youngstown Y1 ....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.35
Cleveland,O. R2	4.35
Ecorse,Mich. G5	4.35
Fairfield,Ala. T2	4.35
Follansbee,W.Va. F4	5.35
Fontana,Calif. K1	5.30
Gary,Ind. U5	4.35
GraniteCity,Ill. G4	5.05
Ind.Harbor,Ind. I-2, Y1	4.35
Irvin,Pa. U5	4.35
Lackawanna,N.Y. B2	4.35
Middletown,O. A10	4.35
Pittsburg,Calif. C11	5.30
Pittsburgh,Pa. J5	4.35
SparrowsPoint,Md. B2	4.35
Steubenville,O. W10	4.35
Warren,O. R2	4.35
Weirton,W.Va. W6	4.35
Youngstown Y1	4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala. R2	4.80
Ashland,Ky.(8) A10	4.80
Canton,O. R2	4.80
Dover,O. R1	5.50
Fairfield,Ala. T2	4.80
Gary,Ind. U5	4.80
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. I-2	4.80
Irvin,Pa. U5	4.80
Kokomo,Ind.(13) C16	5.20
MartinsFerry,O. W10	4.80
Niles,O. N12	6.70
Pittsburg,Calif. C11	5.55
SparrowsPoint,Md. B2	4.80
Steubenville,O. W10	4.80
Torrance,Calif. C11	5.55
Weirton,W.Va. W6	4.80

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. U5	7.20
SparrowsPoint(39) B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	5.35
Irvin,Pa. U5	5.35
Kokomo,Ind.(13) C16	5.75
Niles,O. N12	6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	5.05
Middletown,O. A10	5.05

SHEETS, Electro Galvanized

Cleveland,R2 (28)	5.65
Niles,O. R2 (28)	5.65
Weirton,W.Va. W6	5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.70

SHEETS, Drum Body

Pittsburg,Calif. C11	4.30
Torrance,Calif. C11	4.30

SHEETS, Well Casing

Fontana,Calif. K1	5.10
Torrance,Calif. C11	5.10

BLUED Stock, 29 Ga.

Yorkville,O. W10	6.80
Follansbee,W.Va.(23) F4	6.85

ROOFING SHORT TERNES (8 lb coated)

Gary,Ind. U5	9.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$7.60
Gary,Ind. U5	7.50
Irvin,Pa. U5	7.50
SparrowsPoint,Md. B2	7.60
Yorkville,O. W10	7.50

SHEETS, LT. Coated Ternes, 6 lb

Yorkville,O. W10	$8.40

SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5	$8.50
Yorkville,O. W10	9.50

SHEETS, LONG Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10	5.20
Gary,Ind. U5	5.20
Mansfield,O. E6	6.05
Middletown,O. A10	5.20
Niles,O. N12	6.00
Weirton,W.Va. W6	5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.60

SHEETS, Enameling Iron

Ashland,Ky.(8) A10	4.65
Cleveland,R2	4.65
Gary,Ind. U5	4.65
GraniteCity,Ill. G4	5.35
Ind.Harbor,Ind. I-2	4.65
Irvin,Pa. U5	4.65
Middletown,O. A10	4.65
Youngstown Y1	4.65

Canton,O. R2	5.65	6.10
Fairfield,Ala. T2	5.60	5.85

SHEETS, Culvert No. 16	Cu	Cu Fe
Ashland,Ky. A10	5.60	
Gary,Ind. U5	5.60	5.85
IndianaHarbor,Ind. I-2	5.60	5.85
Irvin,Pa. U5	5.60	5.85
Kokomo,Ind. C16	6.25	
MartinsFy.O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	
SparrowsPt. B2	5.60	
Torrance,Cal. C11	6.35	

SHEETS, Culvert, No. 16 Pure Iron

Ashland,Ky. A10	5.85
Fairfield,Ala. T2	5.85

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland(8) A10	3.85
Cleveland,R2	4.20
Ind.Harbor,Ind. I-2	3.85
Warren,O. R2	4.20

SHEETS, Cold-Rolled Ingot Iron

Cleveland,R2	4.95
Middletown,O. A10	4.85
Warren,O. R2	4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10	5.05
Canton,O. R2	5.55

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	5.30
Middletown,O. A10	5.30

SHEETS, ALUMINIZED

Butler,Pa. A10	8.15

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$8.45	$8.70
Fairfield,Ala. T2	8.55	8.80
Gary U5	8.45	8.70
Ind.Har. I-2, Y1	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts.Cal. C11	9.20	9.45
Sp.Pt.,Md. B2	8.55	8.80
Warren R2	8.45	8.70
Weirton W6	8.45	8.70
Yorkville,O. W10	8.45	8.70

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$6.25
Fairfield,Ala. T2	6.35
Gary,Ind. U5	6.25
GraniteCity,Ill. G4	6.45
Ind.Harbor,Ind. I-2, Y1	6.25
Irvin,Pa. U5	6.25
Niles,O. R2	6.25
Pittsburg,Calif. C11	7.00
SparrowsPoint,Md. B2	6.35
Warren,O. R2	6.25
Weirton,W.Va. W6	6.25
Yorkville,O. W10	6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4	5.85
Gary,Ind. U5	5.85
GraniteCity,Ill. G4	6.05
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. U5	5.85
Yorkville,O. W10	6.15

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.45
Carnegie,Pa. S18	5.85
Fontana,Calif. K1	6.70
Gary,Ind. U5	5.50
Houston,Tex. S5	5.90
KansasCity,Mo. S5	6.10
Midland,Pa. C18	5.85
NewBritn,Conn.(10) S15	5.45
Sharon,Pa. S8	5.85
Youngstown U5	5.50

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	5.30
Conshohocken,Pa. A3	5.55
Ecorse,Mich. G5	5.95
Fairfield,Ala. T2	5.30
Fontana,Calif. K1	6.20
Gary,Ind. U5	5.30
Ind.Harb.,Ind. I-2	5.30
IndianaHarbor,Ind. Y1	5.80
Lackawanna,N.Y. B2	4.95
LosAngeles(25) B3	6.05
Seattle B3	6.30
Sharon,Pa. S3	5.40
So.SanFrancisco(25) B3	6.05
SparrowsPoint,Md. B2	4.95
Warren,O. R2	5.30
Weirton,W.Va. W6	5.75
Youngstown Y1	5.80
Youngstown U5	5.30

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland J5	6.70
Cleveland A7	6.55
Dover,O. G6	7.30
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2	6.40
Sharon,Pa. S8	6.55
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.55
Weirton,W.Va. W6	7.20
Youngstown Y1	7.05

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	3.50
Alton,Ill.(1) L1	3.75
Ashland,Ky.(8) A10	3.50
Atlanta A11	4.05
Bessemer,Ala. T2	3.50
Bridgeprt,Conn.(10) S15	4.00
Buffalo(27) R2	3.50
Butler,Pa. A10	3.50
Carnegie,Pa. S18	4.00
Conshohocken,Pa. A3	3.90
Detroit M1	4.40
Ecorse,Mich. G5	3.80
Fairfield,Ala. T2	3.50
Fontana,Calif. K1	4.75
Gary,Ind. U5	3.50
Houston,Tex. S5	4.90
Ind.Harbor,Ind. I-2, Y1	3.50
Johnstown,Pa.(25) B2	3.50
KansasCity,Mo.(9) S5	4.10
Lackawanna,N.Y.(32) B2	3.50
LosAngeles B3	4.25
Milton,Pa. B6	4.00
Minnequa,Colo. C10	4.55
NewBritain(10) S15	4.00
N.Tonawanda,N.Y. B11	3.50
Pittsburg,Calif. C11	4.25
Riverdale,Ill. A1	3.50
SanFrancisco S7	4.85
Seattle B3, N14	4.50
Sharon,Pa. S3	4.00
So.Chicago,Ill. W14	3.50
So.SanFrancisco B3	4.25
SparrowsPoint,Md. B2	3.50
Torrance,Calif. C11	4.25
Warren,O. R2	3.50
Weirton,W.Va. W6	3.60
WestLeechburg,Pa. A4	3.75
Youngstown U5, Y1	3.50

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10) S15	10.75
Carnegie,Pa. S18	10.60
Cleveland A7	10.00
Dover,O. G6	10.50
Fontana,Calif. K1	11.65
Harrison,N.J. C18	10.60
Midland,Pa. C18	10.60

STRIP, Cold-Finished, Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea,O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
Bristol,Conn. W1	...	...	7.70	9.65	...
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	5.60	7.05	7.65	...	...
Detroit D2	5.60	6.65	7.25	...	...
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
FranklinPark,Ill. T6	5.00	6.60	7.55	9.50	11.85
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.95
NewBritn.,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	...
NewCastle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2	5.85	6.75	7.35	...	...
NewYork W3	...	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. N8:					
Cleve.-or-Pitts.Base	...	6.80	7.40	9.35	11.65
Worcester Base	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6	5.50	6.75	7.70	9.65	11.95
Youngstown C8	...	6.80	7.40	9.35	11.65

Spring Steel (Tempered)

Trenton,N.J. R5	...	...	10.30	12.50	15.35
Harrison,N.J. C18	...	...	10.30	12.50	15.35
NewYork,W3	...	...	10.30	12.50	15.35

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind. U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.55
SparrowsPoint,Md. B2	7.25	7.50	7.90
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	7.80

SHEETS, SILICON, H.R. or C.R.(22 Ga.) Coils (Cut Lengths 1/2c lower)	Field	Arma-ture	Elec-tric	Motor	Dyna-mo
BeechBottom,W.Va.W10 (cut lengths)	...	...	7.25	8.50	9.30
Brackenridge,Pa. A4	...	...	7.75	9.00	9.80
GraniteCity,Ill.G4 (cut lengths)	...	...	7.95	9.20	...
Ind.Harbor,Ind. I-2	6.95	7.25	(34)	...	...
Mansfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)	...	6.75	7.25	...	...
Vandergrift,Pa. U5	...	7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10	...	7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths 1/2c lower) Transformer Grade	72	65	58	52
BeechBottom,W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35	...	...	...
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35	...	...	...
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)	...	...	14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B4 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bolardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.

C1 Calif. Cold Rolled Steel
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
H1 Hanna Furnace Corp.
H4 Heppenstall Co.
I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div. Borg-Warner Corp.
J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Koppers Co. Inc.
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

STRIP, Cold-Rolled Carbon

NewBritn.Conn.(10) S15	10.75
Pawtucket,R.I.(11) N8	10.60
Pawtucket,R.I.(12) N8	11.40
Sharon,Pa. S3	10.60
Worcester,Mass. A7	10.60
Youngstown C8	10.60

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6	5.20
Berea,O. C7	4.80
Bridgeprt,Conn.(10) S15	5.00
Butler,Pa. A10	4.80
Cleveland A7, J5	4.80
Dearborn,Mich. D3	5.40
Detroit D2	4.80
Detroit M1	4.80
Dover,O.(40) G6	5.50
Ecorse,Mich. G5	4.80
Follansbee,W.Va. F4	5.80
Fontana,Calif. K1	5.45
FranklinPark,Ill.(40) T6	5.40
Ind.Harbor,Ind. I-2	4.80
Lackawanna,N.Y. B2	4.80
LosAngeles C1	5.50
Mattapan,Mass. T6	5.50
Middletown,O. A10	4.80
NewBritain(10) S15	5.00
NewCastle,Pa. B4	4.80
NewCastle(40) E5	5.50
NewHaven,Conn. D2	5.85
NewHaven,Conn. A7	5.40
Pawtucket,R.I. R3	5.60
Pawtucket,R.I.(21) N8	5.60
Riverdale,Ill.(40) A1	5.40
Rome,N.Y. R6	5.50
Sharon,Pa. S3	5.00
SparrowsPoint,Md. B2	4.80
Trenton,N.J. R5	5.00
Wallingford,Conn. W2	5.85
Warren,O.(40) T5	5.20
Warren,O. R2	4.80
Weirton,W.Va. W6	4.80
Youngstown C8 (40)	5.20
Youngstown Y1	4.80

STRIP, Electro Galvanized

Dover,O. G6	5.50
Warren,O. T5	5.20
Weirton,W.Va. W6	4.80
Youngstown C8	5.20

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.75
Middletown,O. B2	4.10

Strip, Cold-Rolled Ingot Iron

Middletown,O. B2	5.25

TIGHT COOPERAGE HOOP

Ashland,Ky. A10	4.05
Kokomo,Ind. A1	3.90
Kokomo,Ind. S3	4.15
Youngstown U5	3.75

WIRE, Merchant Quality

	To 8 gage	An'ld Galv.
AlabamaCity,Ala. R2	5.70	5.95
Aliquippa,Pa. J5	5.70	6.15
Atlanta,Ga. A11	5.95	6.40
Bartonville,Ill.(19) K4	5.70	6.15
Buffalo,N.Y. W12	4.85	—
Cleveland,O. A7	5.70	6.15
Crawfordsville,Ind. MS	5.95	6.40
Donora,Pa. A7	5.70	6.15
Duluth,Minn. A7	5.70	6.15
Fairfield,Ala. T2	5.70	6.15
Houston,Tex. S5	6.10	6.55
Johnstown,Pa. B2	5.70	6.15
Joliet,Ill. A7	5.70	6.15
Kansas City,Mo. S5	6.30	6.75
Kokomo,Ind. C16	5.80	6.05
LosAngeles,Calif. B3	6.65	—
Minnequa,Colo. C10	5.95	6.45
Monessen,Pa. P7	5.95	6.40
Palmer,Mass. W12	5.15	—
Pitts.Calif. C11	6.65	6.80
Pittsburgh,Calif.(18) P12	6.10	6.60
Rankin,Pa. A7	5.70	6.15
So.Chicago,Ill. R2	5.70	5.95
So.S.Fran.,Calif. C10	6.65	7.10
Sparrows Pt.,Md. B2	5.80	6.25
Sterling,Ill.(4) N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. CH	6.65	—
Worcester,Mass. A7	6.00	6.45

WIRE (16 gage)	An'ld Galv. Stone	An'ld Galv. Stone
Aliquippa,Pa. J5	10.15	12.15
Bartonville,Ill.(4) K4	10.25	11.95
Cleveland,O. A7	10.25	12.15
Crawfrdsvle,Ind. MS	10.30	12.00
Fostoria,O. S1	10.40	13.00
Johnstown,Pa. B2	10.25	12.15
Kokomo,Ind. C16	10.25	11.95
Minnequa,Colo. C10	10.40	12.40
Palmer,Mass. W12	10.25	12.15
Pitts.Cal. C11	10.60	12.50
Pittsgth.(18) P12	10.55	12.30
SparrowsPt.,Md. B2	10.35	12.25
Waukegan,Ill. A7	10.25	12.15

ROPE WIRE	(A)	(B)
Bartonville,Ill. K4	8.55	8.80
Buffalo,N.Y. W12	8.55	8.80
Cleveland,O. A7	8.55	8.80
Donora,Pa. A7	8.55	8.80
Fostoria,O. S1	8.55	9.10
Johnstown,Pa. B2	8.55	8.80
Monessen,Pa. P16	8.55	8.80
Monessen,Pa. P7	8.80	9.05
NewHaven,Conn. A7	8.85	8.10
Palmer,Mass. W12	8.85	9.10
Portsmouth,O. P12	8.55	8.80
Roebling,N.J. R5	8.85	9.10
SparrowsPt.,Md. B2	8.65	8.90
Struthers,O. Y1	8.55	8.80
Trenton,N.J. A7	8.85	9.10
Waukegan,Ill. A7	8.85	8.80
Worcester,Mass. J4, T6	8.85	9.10

(A) Plow and Mild Plow.
(B) Improved Plow.

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	4.85
Aliquippa,Pa. J5	4.85
Atlanta,Ga. A11	5.10
Alton,Ill.(1) L1	4.85
Bartonville,Ill.(1) K4	4.85
Buffalo,N.Y. W12	4.85
Chicago,Ill. W13	5.10
Cleveland,O. A7, C20	4.85
Crawfordsville,Ind. MS	5.10
Donora,Pa. A7	4.85
Duluth,Minn. A7	4.85
Fairfield,Ala. T2	4.85
Fostoria,O.(21) S81	5.35
Houston,Tex. S5	5.25
Johnstown,Pa. B2	4.85
Joliet,Ill. A7	4.85
KansasCity,Mo. S5	5.45
Kokomo,Ind. C16	4.95
LosAngeles,Calif. B3	5.80
Minnequa,Colo. C10	5.10
Monessen,Pa. P7	5.10
Newark, 6-Sga. I-1	5.50
No. Tonawanda,N.Y. B11	4.85
Palmer,Mass. W12	5.15
Pittsburg,Calif. C11	5.80
Portsmouth,O. P12	5.25
Rankin,Pa. A7	4.85
So.Chicago,Ill. R2	4.85
So. SanFrancisco,Calif. C10	5.80
SparrowsPoint,Md. B2	4.95
Sterling,Ill.(4) N15	4.85
Struthers,O. Y1	4.85
Torrance,Calif. CH	5.80
Waukegan,Ill. A7	4.85
Worcester,Mass. A7, T6	5.15

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	6.20
Buffalo,N.Y. W12	6.35
Cleveland,O. A7	5.85
Crawfordsville,Ind. MS	6.20
Detroit,Mich. D2	6.20
Dover,O. G6	6.20
Fostoria,O. S1	6.00
Kokomo,Ind. C16	5.79
FranklinPark,Ill. T6	6.20
Massillon,O. R8	5.85
Monessen,Pa. P16	5.85
Monessen,Pa. P7	6.10
NewHaven,Conn. D2	6.50
Pawtucket,R.I.(12) N8	6.85
Trenton,N.J. R5	6.15
Worcester,Mass. A7	6.15
Worcester,Mass. T6	6.50
Worcester,Mass. W12	6.65

WIRE, Fine & Weaving(8" Coils)

Bartonville,Ill.(1) K4	8.90
Buffalo,N.Y. W12	8.90
Chicago,Ill. W13	8.90
Cleveland,O. A7	8.90
Crawfordsville,Ind. MS	8.95
Fostoria,O. S1	8.90
Johnstown,Pa. B2	8.90
Kokomo,Ind. C16	8.90
Monessen,Pa. P16	8.90
Palmer,Mass. W12	9.20
Portsmouth,O. P12	8.90
Roebling,N.J. R5	9.20
Waukegan,Ill. A7	8.90
Worcester,Mass. A7, T6	9.20

WIRE, Galv'd ACSR For Cores

Bartonville,Ill. K4	8.50
Monessen,Pa. P16	8.50
Roebling,N.J. R5	8.80
SparrowsPoint,Md. B2	8.60
Johnstown,Pa. B2	8.50

WIRE, Tire Bead

Bartonville,Ill.(1) K4	10.90
Monessen,Pa. P16	11.40
Roebling,N.J. R5	11.55

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	6.25
Alton,Ill.(1) L1	6.25
Bartonville,Ill.(1) K4	6.25
Buffalo,N.Y. W12	6.25
Cleveland,O. A7	6.25
Donora,Pa. A7	6.25
Duluth,Minn. A7	6.25
Fostoria,O. S1	6.25
Johnstown,Pa. B2	6.25
LosAngeles,Calif. B3	7.20
Milbury,Mass.(12) N6	8.05
Monessen,Pa. P7, P16	6.25
Palmer,Mass. W12	6.55
Pittsburg,Calif. C11	7.20
Roebling,N.J. R5	6.55
Portsmouth,O. P12	6.25
Riverdale,Ill. A1	6.25
So.Chicago,Ill. R2	6.25
So.SanFrancisco,Calif. C10	6.85
SparrowsPoint,Md. B2	6.35
Struthers,O. Y1	6.25
Trenton,N.J. A7	6.55
Waukegan,Ill. A7	6.25
Worcester,A7, T6, W12	6.55
Worcester,Mass. J4	6.75

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	5.90
Buffalo,N.Y. W12	5.90
Cleveland,O. A7	5.90
Donora,Pa. A7	5.90
Duluth,Minn. A7	5.90
Johnstown,Pa. B2	5.90
LosAngeles,Calif. B3	6.85
Monessen,Pa. P7, P16	5.90
NewHaven,Conn. A7	6.20
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	7.10
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Torrance,Calif. C11	7.10
Trenton,N.J. A7	6.20
Waukegan,Ill. A7	5.90
Worcester,Mass. A7	6.20

WOVEN FENCE, 9-15½ Ga.

	Col.
AlabamaCity,Ala. R2	126
Ala.City,Ala.,17-18ga.R2	213
Aliquippa,Pa.9-14½ga.J5	130
Atlanta,Ga. A11	133
Bartonville,Ill.(19) K4	130
Crawfordsville,Ind. MS	132
Donora,Pa. A7	130
Duluth,Minn. A7	130
Fairfield,Ala. T2	130
Houston,Tex. S5	138
Johnstown,Pa. B2	130
Johnstown,17ga.,6" B2	204
Johnstown,17ga.,4" B2	207
Joliet,Ill. A7	130
KansasCity,Mo. S5	142
Kokomo,Ind. C16	132
Minnequa,Colo. C10	138
Monessen,Pa. P7	135
Pittsburg,Calif. C11	153
Portsmouth,O.(18) P12	137
Rankin,Pa. A7	130
So.Chicago,Ill. R2	126
Sterling,Ill.(1) N15	130

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2	140
Duluth,Minn. A7	125
Franklin,Pa. F5	140
Huntington,W.Va. W7	140
Johnstown,Pa. B2	140
Marion,O. P11	140
Minnequa,Colo. C10	136
Moline,Ill. R2	136
So.Chicago R2	140
Tonawanda B12	140
Williamsport,Pa. S19	150

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	156
Aliquippa,Pa. J5	140
Atlanta,Ga. A11	143
Bartonville,Ill.(19) K4	143
Crawfordsville,Ind. MS	145
Donora,Pa. A7	140
Duluth,Minn. A7	140
Fairfield,Ala. T2	140
Houston,Tex. S5	148
Johnstown,Pa. B2	140
Joliet,Ill. A7	140
KansasCity,Mo. S5	152
Kokomo,Ind. C16	142
Minnequa,Colo. C10	146
Monessen,Pa. P7	145
Pittsburg,Calif. C11	160
Portsmouth,O.(18) P12	147
Rankin,Pa. A7	140
So.Chicago,Ill. R2	156
So.SanFran.,Calif. C10	160
SparrowsPoint,Md. B2	142
Sterling,Ill.(1) N15	140

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	123
Atlanta,Ga. A11	126
Bartonville,Ill.(19) K4	123
Crawfordsville,Ind. MS	132
Donora,Pa. A7	123
Duluth,Minn. A7	123
Fairfield,Ala. T2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	125
Pittsburg,Calif. C11	147
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	147
SparrowsPoint,Md. B2	123
Sterling,Ill.(1) N15	123

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2	6.10
Bartonville,Ill.(19) K4	5.95
Crawfordsville,Ind. MS	6.30
Donora,Pa. A7	5.95
Duluth,Minn. A7	5.95
Johnstown,Pa. B2	5.95
Joliet,Ill. A7	5.95
Kokomo,Ind. C16	6.05
Minnequa,Colo. C10	6.20
Pittsburg,Calif. C11	6.90
Portsmouth,O. P12	6.25
Rankin,Pa. A7	5.95
So.Chicago,Ill. R2	6.10
SparrowsPoint,Md. B2	6.05
Sterling,Ill.(1) N15	5.65
Worcester,Mass. A7	6.25

NAILS, Cut (100 lb keg)

To dealers (33)	
Conshohocken,Pa. A3	$7.35
Wheeling,W.Va. W10	7.15

NAILS & STAPLES, Stock

To dealers & mfrs. (7)	Col.
AlabamaCity,Ala. R2	118
Aliquippa,Pa.(13) J5	118
Atlanta,Ga. A11	121
Bartonville,Ill.(19) K4	118
Chicago,Ill. W13	118
Cleveland,O. A9	125
Crawfordsville,Ind. MS	122
Donora,Pa. A7	118
Duluth,Minn. A7	118
Fairfield,Ala. T2	118
Galveston,Tex. D7	126
Houston,Tex. S5	126
Johnstown,Pa. B2	118
Joliet,Ill. A7	118
KansasCity,Mo. S5	130
Kokomo,Ind. C16	120
Minnequa,Colo. C10	123
Monessen,Pa. P7	124
Pittsburg,Calif. C11	137
Portsmouth,O. P12	124
Rankin,Pa. A7	118
So.Chicago,Ill. R2	118
SparrowsPoint,Md. B2	120
Sterling,Ill.(4) N15	118
Torrance,Calif. C11	138
Worcester,Mass. A7	124

STANDARD TRACK SPIKES

Ind.Harbor,Ind. I-2, Y1	6.15
KansasCity,Mo. S5	6.40
Lebanon,Pa. B2	6.15
Minnequa,Colo. C10	6.15
Pittsburgh,Pa. J5	6.15
Seattle,Wash. B3	6.65
So.Chicago,Ill. R2	6.15
Struthers,O. Y1	6.15
Youngstown R2	6.15

TRACK BOLTS (20) Treated

KansasCity,Mo. S5	9.85
Lebanon,Pa.(32) B2	9.85
Minnequa,Colo. C10	9.85
Pittsburgh,Pa. P14	9.85
Seattle,Wash. B3	10.10

TIE PLATES

Fairfield,Ala. T2	4.50
Gary,Ind. U5	4.50
Ind.Harbor,Ind. I-2	4.50
Lackawanna,N.Y. B2	4.50
Minnequa,Colo. C10	4.50
Pittsburg,Calif. C11	4.65
Seattle,Wash. B3	4.65
Steelton,Pa. B2	4.50
Torrance,Calif. C11	4.65

JOINT BARS

Bessemer,Pa. U5	4.70
Fairfield,Ala. T2	4.70
Ind.Harbor,Ind. I-2	4.70
Joliet,Ill. U5	4.70
Lackawanna,N.Y. B2	4.70
Minnequa,Colo. C10	4.70
Steelton,Pa. B2	4.70

AXLES

Ind.Harbor,Ind. S18	5.60
Johnstown,Pa. B2	5.60

RAILS	Std. No. 1	Std. No. 2	Ail No. 2	TeeRails 60 lb Under
Bessemer,Pa. U5	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	—	4.00
Fairfield,Ala. T2	—	—	—	4.00
Gary,Ind. U5	3.60	3.50	3.55	—
Huntington,W.Va. W7	—	—	—	5.00
Ind.Harbor,Ind. I-2	3.60	3.50	3.55	—
Johnstown,Pa. B2	—	—	—	(16)4.00
Lackawanna,N.Y. B2	3.60	3.50	—	4.00
Minnequa,Colo. C10	3.60	3.50	—	4.50
Steelton,Pa. B2	3.60	3.50	—	—
Williamsport,Pa. S19	—	—	—	4.75

Key to Producers

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts.Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield.S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.

U1 Ulster Iron Works
U4 Universal Cyclops Steel
U5 United States Steel Co.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W16 Worth Steel Co.
W18 Wyckoff Steel Co.

Y1 Youngstown Sheet & Tube

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	23.00	13.5W.4Cr.3V	110.00
Extra Carbon	27.00	18W.4Cr.2V.9Co	217.50
Spec. Carbon	32.50	19W.4Cr.2V.7Co	217.50
Oil Hardening	35.00	18.25W.4.25Cr.1V.4.75Co	185.50
Cr Hot Wrk	35.00	20.25W.4.25Cr.1.6V.12.25Co	323.00
Hi-Carbon-Cr	62.50	1.5W.4Cr.1V.8.5Mo	78.50
18W.4Cr.1V	125.50	6.4W.4.5Cr.1.9V.5Mo	87.00
18W.4Cr.2V	138.00	6W.4Cr.3V.6Mo	100.50

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M14, S8, U4, V2, V3.

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga & heavier.
(14) Also wide flange beams.
(15) ½" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. base.
(22) Dd. San Fran. Bay area.
(23) 28 Ga. 26" wide.
(24) Deduct 0.20c finer than 15 Ga.
(25) Bar, mill bands.
(26) Reinforcing, to fabricators (dec. turn, billet, 5.40c); to consumers, 6.15c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Subject to 10% increase.
(30) Sheared; add 0.35c for universal mill.
(31) 5/8" annealed.
(32) Rd. edge or square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter; 60" & narrower.
(38) 14 gage & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.0155"; 0.0155" and heavier, 0.25c higher.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % —Black— A	B	C	—Galvanized— D	E	F
⅛	5.5c	0.24	34.0	32.0	29.0	1.5	+0.5	+3.5
¼	6.0	0.42	28.5	26.5	23.5	+1.0	+3.0	+6.0
⅜	6.0	0.57	23.5	21.5	18.5	+7.0	+9.0	+12.0
½	8.5	0.85	36.0	34.0	35.0	14.0	12.0	13.0
¾	11.5	1.13	39.0	37.0	38.0	18.0	16.0	17.0
1	17.0	1.68	41.5	39.5	40.5	21.5	19.5	20.5
1¼	23.0	2.28	42.0	44.0	41.0	22.0	24.0	21.0
1½	27.5	2.78	42.5	41.5	41.5	23.0	21.5	22.0
2	37	3.68	43.0	41.0	42.0	23.5	21.5	22.5
2½	58.5	5.82	43.5	41.5	42.5	24.0	22.0	23.0
3	76.5	7.62	43.5	41.5	42.5	24.0	22.0	23.0

Column A: Etna, Pa. N2; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 3½ points lower on ⅛", 1½ points lower on ¼", and 2 points lower on ⅜", W10; Sharon, Pa. M6, 1 point higher on ⅛", 2 points lower on ½" and ⅝"; following make ½" and larger: Lorain, O., N3; Youngstown R2 and 36¼% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11½ points lower on ½" and larger continuous weld and 24% on 3½" and 4". Columns B & E: Sparrows Point, Md. B2.

Columns C & F: Indiana Harbor, Ind., ⅛" through 3", Y1; Alton, Ill. (Gary base) L1.

Column D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, except plus 3½% on ⅛", plus 2½% on ¼", plus 9% on ⅜"; Sharon, Pa. M6, plus 0.5 on ⅛", 1 point lower on ½", ⅝", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3". Following quote only on ½" and larger: Lorain, O. N3; Youngstown R2, and 16½% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5 quotes 1 point lower on ¾", 2 points lower on 1", 1½ points lower on 1¼", 2 points lower on 1½" and 2", 1½ points lower on 2½" and 3"; Etna, Pa. N2 and 18½% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	29.5	8.5	29.5	9.5
2½	58.5	5.82	32.5	12.5	32.5	12.5
3	76.5	7.62	32.5	12.5	32.5	12.5
3½	92.0	9.20	34.5	14.5	34.5	14.5
4	$1.09	10.89	34.5	14.5	34.5	14.5
5	1.48	14.81	37.0	17.0	37.0	17.0
6	1.92	19.18	37.0	17.0	37.0	17.0

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt lower on 2½-6 in.; Lorain, N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mfl; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Ga.	—Seamless— H.R.	C.D.	Elec. Weld H.R.	C.D.
1	13	13.45	16.47	15.36	15.36
1¼	13	16.09	19.71	15.61	18.19
1½	13	17.27	21.15	17.25	20.30
1¾	13	19.29	23.62	19.62	23.09
2	13	21.62	26.45	21.99	25.86
2¼	13	24.35	29.82	24.50	28.84
2¼	12	26.92	32.97	26.98	31.76
2½	12	29.65	36.32	29.57	34.76
2¾	12	32.11	39.33	31.33	36.84
3	12	34.00	41.64	32.89	38.70

CLAD STEELS

(Cents per pound)

Cladding Stainless	—Plates— Carbon Base 10%	20%	—Strip— Cold-Rolled Carbon Base Both Sides	—Sheets— Carbon Base 10%	20%	Cu Base Both Sides
302	....	....	....	19.75	27.50	77.00
304	25.00	28.00-29.50	....	20.75-24.50	27.50	77.00
309	30.50	35.00	....	....	....	....
310	36.50	41.00	....	....	....	144.00
316	29.50	31.50-34.00	....	26.00	36.50	....
317	34.50	39.00	....	....	....	....
318	38.50	38.00	....	....	....	....
321	26.50	31.00	....	23.00	33.00	111.00
347	27.50	30.50-32.00	....	24.00	33.50	130.00
405	21.25	27.75	....	....	....	....
410	20.75	27.25	....	....	....	....
Nickel	83.25	44.25	41.00	54.00	....	....
Inconel	41.00	53.50	....	....	....	165.00
Monel	34.75	45.75	....	....	....	....
Copper*	....	....	23.70†	29.65‡	....	....

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, steel, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16, Coatesville, Pa. L7 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; nickel, monel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 15
- ⅝-in. & ¾-in. 18.5
- ⅞-in. and larger 17.5

Longer than 6 in.:
- All diams. 14

Lag bolts, all diams.:
- 6 in. and shorter 23
- over 6 in. long 21

Ribbed Necked Carriage 18.5
Blank 34
Plow 34
Step, Elevator, Tap, and Sleigh Shoe 21
Tire bolts 12
Boiler & Fitting-Up bolts 31

NUTS

	Reg.	Heavy
H.P. & C.P. Square:		
½-in. & smaller	15	15
⅝-in. & ⅞-in.	12	6.5
1-in.-1½-in.	9	1
1⅝ in. & larger	7.5	1
H.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅞-in.	16.5	6.5
1-in.-1½-in.	12	2
1⅝ in. & larger	8.5	2
C.P. Hex.		
½-in. & smaller	26	22
⅝-in. & ⅞-in.	23	17.5
1-in. & 1½-in.	19.5	12
1⅝-in. & larger	12	6.5

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

	Reg.	Hvy.
½-in. & smaller	35	28.5
⅝-in. & ⅞-in.	29.5	22
1-in.-1½-in.	24	15
1⅝-in. & larger	13	8.5

	Light
⅛-in. & smaller	35
1/2-in. to ⅝-in.	28.5
¾-in. to 1½-in.	26

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish .....48 & 10
Plated finishes....31 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ⅝-in. & smaller 42
- ¾-in. through 1 in. ... 34

Longer than 6 in.:
- ⅝-in. & smaller 26
- ¾-in. through 1 in. ... 4

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter 38
1 in. and smaller diam. x over 6 in. 26

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 35
¼-in. diam. & larger.... 16
N.F. thread, all diams... 10

RIVETS

F.o.b. midwestern plants
Structural ½-in., larger 7.85c
7/16-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..List to list-plus-50c.

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

—Inches— Diam.	Length	Cents per lb
17,18,20	60,72	17.85
8 to 16	48,60,72	17.85
7	48,60	19.57
6	48,60	20.95
4,5⅛	40	21.50
3	40	22.61
2½	24,30	23.15
2	24,30	25.36

CARBON

40	100,110	8.03
35	100,110	8.03
30	84,110	8.03
24	72 to 104	8.03
17 to 20	34,90	8.03
14	60,72	8.57
10,12	60	8.84

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	41.00	34.00	31.25
302...	41.00	36.50	31.25
303...	43.00	40.00	33.75
304...	43.00	38.50	32.75
309...	55.50	54.50	44.25
316...	56.50	58.50	48.75
321...	49.00	48.00	36.75
347...	53.50	52.00	41.25
410...	36.50	30.50	25.75
416...	37.00	37.00	26.25
420...	44.00	47.00	31.25
430...	39.00	31.00	26.25
501...	27.50	26.00	14.25
502...	28.50	27.00	15.25

Baltimore, Types 301 through 347 sheet, except 309 E2.
Brackenridge, Pa., sheets A4.
Bridgeville, Pa., bars, wire, sheets & strip U4.
Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.
Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502, S18.
Cleveland, strip A7.
Detroit, strip, except Types 309, 321, 416, 420, 501 and 502 M1.
Dunkirk,N.Y., bars, wire A4.
Duquesne, Pa., bars U5.
Fort Wayne, Ind., bars and wire, except Types 501 & 502 J6.
Gary, Ind., sheets except Type 416 U5.
Harrison, N. J., strip C18.
McKeesport, Pa., bars, sheets except Type 416 U5.
McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.
Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.
Midland, sheets & strip C18.
Munhall, Pa., bars U5.
Pittsburgh, sheets C18.
Reading, Pa., bars and strip, except 55.50c for Type 309 strip and 44.75c for Type 309 bars, C4.
Sharon, Pa., strip, except Types 303, 309, 316, 416, 501 and 502 S3.
So. Chicago, Ill., bars & structurals U5.
Syracuse, N. Y., bars, wire & structurals C18.
Titusville, Pa., bars, U4.
Wallingford, Conn., strip, except 309, W2 quotes 0.25 cents higher.
Washington, Pa., bars, sheets & strip, except Type 309 sheets 56.00c and bars 44.75c, J3.
Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 61.50c, strip 63.00c, W4.
Watervliet, N. Y., structurals & bars A4.
Waukegan, bars & wire A7.
West Leechburg, Pa., strip, A4.
Youngstown, strip, except Types 303, 309, 316, 416, 501 and 502 C8.

COAL CHEMICALS

Spot, cents per gallon, ovens
Pure benzol 30.00-35.00
To'uol, one deg...26.00-33.00
Industrial xylol ..25.00-33.50
Per ton bulk, ovens
Sulphate of ammonia..$32-$45
Cents per pound, ovens
Phenol, 40 (carlots, non-returnable drums) ..17.25
Do., less than carlots..18.00
Do., tank cars 15.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70%, $43; 60%, $40.
Imported, net ton, duty paid, metallurgical grade, $33-$35.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted.)

Sponge iron ..... Cents
98+% Fe, carlots 15.00
Swedish, c.i.f. New York, in bags... 40-8.50
Electrolytic Iron:
Annealed, 99.5% Fe 42.50
Unannealed, 99 + % Fe 36.50
Unannealed, 99 + % Fe minus 325 mesh 58.50
Powder Flakes 48.50
Carbonyl Iron:
97.9-99.8%, size 5 to 10 microns..83.00-148.00
Aluminum:
Carlots, freight allowed 29.50
Atomized, 500 lb drums, freight allowed 33.50
Brass, 10-ton lots 30.00-33.25
Bronze, 10-ton lots 51.25-60.00
Phosphor-Copper, 10 tons 50.00
Copper:
Electrolytic 43.25
Reduced 33.75-37.00
Lead 26.50
Manganese:
Minus 100-mesh 57.00
Minus 35 mesh 52.00
Minus 200 mesh 62.00
Nickel unannealed 83.00
Nickel-Silver, 10-ton lots 44.00
Silicon 38.50
Solder (plus cost of metal) 8.50
Stainless Steel, 302 ..... 83.00
Tin $1.935
Zinc, 10-ton lots.23.00-30.50
Tungsten: Dollars
99%, minus 80 to 200 mesh, freight allowed:
1000 lb and over . 4.00
Less than 1000 lb ... 4.15
98.8% minus 65 mesh, freight allowed:
1000 lb. and over... 4.15
less than 1000 lb.... 4.25
Molybdenum:
99%, minus 80 to 200 mesh, over 500 lb 2.85
200 to 500 lb 3.10
less than 200 lb ... 3.25
Chromium, electrolytic 99% Cr min. 3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvll,fur. .$14.50-15.00
Connellsvll,fdry. .17.00-18.00
New River, foundry....19.50
Wise county, foundry..15.95
Wise county, furnace..15.20

OVEN FOUNDRY COKE

Kearney, N. J., ovens $22.75
Everett, Mass., ovens
New England, del. .24.50
Chicago, ovens 21.00
Chicago, del. .....†22.45
Detroit, del. 24.91
Terre Haute, ovens... 22.50
Milwaukee, ovens 23.75
Indianapolis, ovens.... 22.75
Chicago, del. 26.62
Cincinnati, del. 25.67
Detroit, del. 26.65
Ironton, O., ovens 21.50
Cincinnati, del. 24.06
Painesville, O., ovens. 24.00
Buffalo, del. 26.12
Cleveland, del. 25.72
Erie, Pa., ovens 23.50
Birmingham, ovens ... 20.30
Birmingham, del. ... 21.69
Philadelphia, ovens ... 22.70
NevilleIsland,Pa.,ovens 23.00
Swedeland, Pa., ovens 22.00
St. Louis, ovens 24.25
St. Louis, del. 25.38
Portsmouth, O., ovens 21.50
Cincinnati, del. 24.06
Detroit, ovens 24.00
Detroit, del. *25.00
Buffalo, del. 26.69
Flint, del. 26.44
Pontiac, del. 25.39
Saginaw, del. 26.75

Includes representative switching charge of: *, $1.00; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.15 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Galv. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140‖		Carbon	Floor
New York (city)	6.27	7.29	8.44	6.59	...	6.42	7.29	9.25	6.40	6.58	8.04
New York (c'try)	5.97	6.99	8.14	6.29	...	6.12	6.99	8.95	6.10	6.28	7.74
Boston (city)	6.40	7.20	8.49	6.35	...	6.25	7.04	9.25	6.40	6.98	7.88
Boston (c'try)	6.20	7.00	8.29	6.15	...	6.05	6.84	9.05	6.20	6.78	7.68
Phila. (city)	7.15	7.05	8.25	6.35	...	6.30	7.11	8.90	6.15	6.30	7.40
Phila. (c'try)	6.90	6.80	8.00	6.10	...	6.05	6.86	8.65	5.90	6.05	7.15
Balt. (city)	5.80	7.04	8.27	6.24	...	6.24	7.09	...	6.34	6.00	7.64
Balt. (c'try)	5.60	6.84	8.07	6.04	...	6.04	6.89	...	6.14	5.80	7.44
Norfolk, Va.	6.50	...	...	6.70	...	6.55	7.70	...	6.60	6.50	8.00
Richmond, Va.	5.90	...	8.10	6.10	...	6.10	6.90	...	6.30	6.06	7.80
Wash. (w'hse)	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
Buffalo (del.)	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††‖	6.00	6.25	7.55
Buffalo (w'hse)	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††‖	5.80	6.05	7.35
Pitts. (w'hse)	5.60	6.40*	7.75	5.65-5.95	6.90	5.55	6.40	10.10††	5.70	5.75	7.00
Detroit (w'hse)	5.45-5.78	6.53-6.80	7.99	5.94-5.95	7.75	5.84	6.56	8.91	6.09	6.19-6.35	7.28
Cleveland (del.)	5.80	6.60	8.30	5.89	7.10	5.77	6.60-6.70	8.91	10.02	6.12	7.32
Cleve. (w'hse)	5.60	6.40	8.10	5.69	6.90	5.57	6.40-6.50	8.71	5.82	5.92	7.12
Cincin. (city)	6.02	6.59	7.34	5.95	...	5.95	6.51	...	6.24	6.34	7.50
Chicago (city)	5.80	6.60	7.95	5.75	...	5.75	6.50	10.30	5.90	6.00	7.20
Chicago (w'hse)	5.60	6.40	7.75	5.55	...	5.55	6.30	10.10	5.70	5.80	7.00
Milwaukee (city)	5.94	6.74	8.09	5.89	...	5.89	6.74	10.44	6.04	6.14	7.34
Milwau. (c'try)	5.74	6.54	7.89	5.69	...	5.69	6.54	10.24	5.84	5.94	7.14
St. Louis (del.)	5.68	6.48	7.28	5.63	...	5.63	6.28	10.08††‖	5.78	5.93	7.13
St. L. (w'hse)	5.48	6.28	7.08	5.43	...	5.43	6.08	9.88††‖	5.58	5.73	6.93
Kans. City (city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
KansCity (w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
Omaha, Nebr.	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Birm'hm (city)	5.75	6.55	6.90§	5.70	...	5.70	7.53	...	5.85	6.10	8.25
Birm'hm (w'hse)	5.60	6.40	6.75§	5.55	...	5.55	7.53	...	5.70	5.95	8.23
Los Ang. (city)	6.55	8.10	9.05§	6.60	8.90	6.55	7.75	...	6.55	6.60	9.20
L. A. (w'hse)	6.35	7.90	8.85§	6.40	8.70	6.35	7.55	...	6.35	6.40	8.70
San Francisco	6.65	7.80*	8.90§	6.60	...	6.45	8.20	...	6.45	6.50	8.60
Seattle-Tacoma	7.05	8.60§	9.20§	7.30	...	6.75	9.10	11.15	6.65	6.75	8.80

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded; ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; ‖—500 to 1499 lb; §—450 to 1499 lb; ‖—3500 lb and over; §—1000 to 1999 lb.

REFRACTORIES

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Hayward, Ashland, Ky., Clearfield, Curwensville, Pa., Ottawa, Ill., $116.60. Hard-fired, St. Louis, Vandalia, Mo., Olive Hill, Ky., $156.20.

High-Heat Duty: Salina, Pa. $99.60 Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, Curwensville, Lumber, Lockhaven, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Ky., Troup, Athens, Tex., Stevens Pottery, Ga., Bessemer, Ala., Portsmouth, Oak Hill, O., Ottawa, Ill., $94.60.

Intermediate-Heat Duty: St. Louis, Farber, Vandalia, Mo., West Decatur, Orviston, Beach Creek, Curwensville, Lumber, Lockhaven, St. Marys, Clearfield, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Hayward, Ky., Athens, Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $88; Bessemer, Ala., $79.20.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., $79.20; Parral, O., $78.50; St. Marys, Pa., $76; Ottawa, Ill., $70.

LADLE BRICK

Dry Press: Chester, New Cumberland, W. Va., Freeport, Merill Station, Clearfield, Pa., Irondale, Wellsville, O. $66.

Wire Cut: Chester, Wellsville, O., $64.

MALLEABLE BUNG BRICK

St. Louis, Vandalia, Farber, Mo., Olive Hill, Ky., $105.60; Beach Creek, Pa., $94.60; Ottawa, Ill., $90.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $94.60; Hays, Pa., $100.10; Joliet, Rockdale, Ill., E. Chicago, Ind., $104.50: Lehi, Utah, Los Angeles, $111.10.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $92.40.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $93.50.

BASIC BRICK

Per net ton, Baltimore or Chester, Pa. Burned chrome brick, $73-$78; chemical-bonded chrome brick, $77-$82; magnesite brick, $99-$104; chemical-bonded magnesite, $88-$93.

MAGNESITE

Per net ton, Chewelah, Wash. Domestic deadburned, ⅝" grains; bulk, $36.30; single paper bags, $41.80.

DOLOMITE

Per net ton. Domestic, burned bulk; Bonne Terre, Mo., $12.15; Martin, Millersville, Narlo, Clay Center, Woodville, Gibsonburg, Bettsville, O., Billmeyer, Plymouth Meeting, Blue Bell, Williams, Pa., Millville, W. Va., $13.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950 in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

EASTERN LOCAL ORE

Cents per unit, del. E. Pa.

Foundry and basic 56-62% concentrates contract	17.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$38-$39
Domestic scheelite, del.	nominal

MANGANESE ORE

Indian manganese, 46-48%, nearby, 92.00-96.00c per long ton unit, c.i.f. U. S. ports, duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 79.8-81.8c.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

	Indian and African	
48%	2.8:1	$32.50
48%	3:1	35.00-36.00
48%	no ratio	26.00
	South African Transvaal	
44%	no ratio	$24.00-25.00
45%	no ratio	20.00
48%	no ratio	$31.00-32.00
50%	no ratio	28.00-28.50
	Brazilian	
44%	2.5:1 lump	$32.00
	Rhodesian	
45%	no ratio	$20.00-21.00
48%	no ratio	26.00
48%	3:1 lump	35.00-36.00
	Domestic—rail nearest seller	
48%	3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb. molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $75, Palmerton, Pa.; $75, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $185 per gross ton of alloy, c.l. packed, $197; gross ton lots, packed, $212; less gross ton lots, packed, $229; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., Welland, Ont., or Ashtabula, O. Base price: $187, Johnstown, Pa.; $185, Sheridan, Pa.; $188, Etna, Pa.; $190, Chattanooga, Tenn. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, Oakland, Portland, Oreg. Shipment from Chicago warehouse, ton lots $227; less gross ton lots, $244 f.o.b. Chicago. Add or subtract $2.30 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 25.75c per lb of contained Mn, carload packed 26.5c, ton lot 27.6c, less ton 28.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% min., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max.). Carload, lump, bulk 19.15c per lb of contained Mn, carload packed 19.9c, ton lot 21.0c, less ton 22.2c. Delivered. Spot, add 0.25c.

Manganese Metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 34c per lb of metal; packed, 34.75c; ton lot 36.25c; less ton lot 38.25c. Delivered. Spot, add 2c.

Manganese Electrolytic: 250 lb to 1999 lb, 32c; 2000 to 39,999 lb, 30c; 40,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

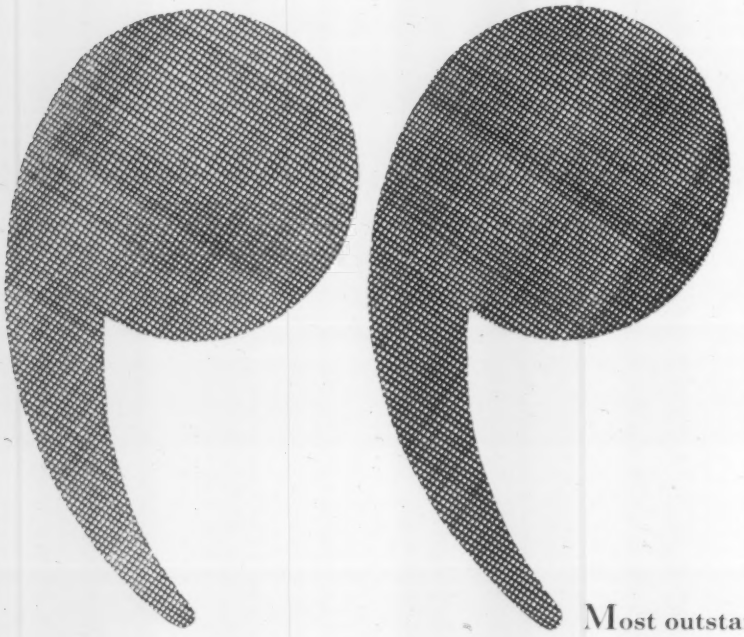
Silicomanganese: (Mn 65-68%). Contract, lump bulk, 1.50% C grade, 18.20% Si 9.90c per lb of alloy, carload packed, 10.65c, ton lot 11.55c, less ton 12.55c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2 from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 21.75c per lb of contained Cr, c.l., packed 22.65c, ton lot 23.80c, less ton 25.20c. Delivered. Spot, add 0.25c.

"SM" Ferrochrome: (Cr 60-65% Si 4-6%, Mn

(Please turn to page 165)



Most outstanding increase in steel-making capacity in the West (since World War II) has been that of the Kaiser Fontana plant . . .

THAT quotation from *Iron Age*, authoritative journal of the steel industry, is confirmed by these facts:

Kaiser Steel has increased ingot production from 553,000 tons in 1944 to an estimated 1,380,000 tons for 1951—more than twice the production of the peak war year!

Equally important is the diversification which has taken place in the past nine years. Kaiser Steel now makes the following products which were not produced in the seven western states prior to World War II: Plates, continuous weld pipe, electric weld pipe, cold rolled strip and sheet, alloy bars, and certain sizes of structural shapes.

Today, when more steel is vitally needed, Kaiser Steel continues its program of further expansion.

This constant growth is another reason why the West Coast's only integrated *independent* steel plant is bringing more industry, more jobs, more wealth to the West!

It's good business to do business with

Kaiser Steel

built to serve the West

PROMPT, DEPENDABLE DELIVERY AT COMPETITIVE PRICES • plates • continuous weld pipe • electric weld pipe • hot rolled strip • hot rolled sheet • alloy bars carbon bars • structural shapes • cold rolled strip • cold rolled sheet • special bar sections • semi-finished steels • pig iron • coke oven by-products For details and specifications, write: **KAISER STEEL CORPORATION, LOS ANGELES, OAKLAND, SEATTLE, PORTLAND, HOUSTON, TULSA, NEW YORK**

The Metal Market

Fabricators curtail operations due to shortages of nonferrous metals and lack of DO orders. Manpower problem becomes progressively more serious. Tin prices drop sharply

INCREASING scarcity of metals, coupled with insufficient DO orders, presents a serious problem to fabricators. Every possible supply source is being explored and, in some instances, improvisation is necessary. A few fabricators are operating only two shifts, three days a week.

The metal shortages are particularly acute on the West Coast. Brig. Gen. O. E. Walsh, North Pacific division engineer, says the shortage of critical materials is having a pronounced effect" on the progress of several federal construction projects, aluminum, copper and steel being the most critical. Throughout this section small shops using these materials are in a desperate plight, many of them prepared to restrict operations until defense orders are obtained. Unless metal sash and door plants, for instance, obtain military contracts or get metal allocations, many will have to close by June 30.

Stringency in copper supplies is increasing as defense needs mount. Manufacturers must reduce on Apr. 1 their use of copper for all nondefense production 25 per cent below their quarterly use in the first half of 1950. The present cut is 20 per cent. Copper continues banned entirely in a long list of civilian consumer goods.

Lack of defense orders threatens to slow down operations of fabricators as much as, if not more than, the shortage of metal. Delay in placing defense contracts in volume is attributed to the fact that blueprints for war goods must be revised because so much equipment used in World War II is obsolete. Armament orders account for about 15 per cent of the volume of brass mill business now and will account for a larger percentage in the second quarter.

No early relief in the form of increased production of refined copper is expected; a reduction in output is more likely. Custom smelters and refiners are being "price frozen" out of the market for scrap copper they need. These producers can not compete under the present price regulation with other buyers of copper scrap. Brass ingot makers are permitted to pay several cents a pound more for red metal scrap than the custom smelters. One large eastern copper refinery is being forced to reduce refined copper output about 1000 tons a month and will be forced to make a further downward revision, possibly as much as 4000 tons a month, unless the scrap supply situation changes. Several other refineries report similar conditions.

A general strike of clerical workers in Chile is hampering the loading of copper on steamers for the United States. If prolonged, this strike would result in reduced supplies from this major source of foreign copper.

Manpower problems likely will become more troublesome this year in smelting and refining, and rolling and drawing nonferrous metal plants. Impact of the rearmament program continues to spread over a widening segment of the industry. Employment in primary copper smelteries and refineries is expected to remain fairly stable during most of the first half of this year. Brass mill employers look for a net employment expansion of about 1.5 per cent by April and 3.5 per cent by June from yearend levels.

Aluminum Output at 7-Year High

If employer hiring schedules are met, primary aluminum employment should be about 4 per cent above December levels by April and move up another 3 per cent by mid-year. Extensive production gains in aluminum plate, sheet, wire, rod, bar and tubing are indicated by employment schedules of fabricating plants. Aluminum rolling and drawing plants look for a 5 per cent employment rise by April and an additional 4 per cent gain by June.

Although production of primary aluminum is currently about 13 per cent larger than the average in 1950, do not look for an easing in availability for consumer goods. Aluminum requirements for production of goods for the armed services will take more than the increased production. Domestic production of the metal in January was 67,954 tons, the highest monthly output since April, 1944. Shipments exceeded production by 3694 tons, bringing stocks in the hands of producers at the end of January to 12,942 tons, the lowest total since September, 1950.

Tin Users Get Price Relief

Your tin costs will be lower over the next few months, but supplies will remain extremely tight. Straits tin for May delivery was available last week at around $1.40 compared with $1.88 for prompt delivery at the end of last month. The world tin market cracked wide open last week as a direct result of the United States government's decision to cease stockpiling "until the price of tin reaches a reasonable level." Consumers and dealers showed little, if any buying interest, pending further developments. Purchases of tin by the government for industrial use will be held to the barest minimum.

The cessation of tin stockpiling followed the Senate Preparedness Committee's demand for such action on grounds this country's allies are "gouging" the United States on tin prices. A Bureau of Mines official estimates that supplies now in the United States, in addition to those in the permanent stockpile, will be enough to meet needs for two years, if tin use is cut to rock bottom. This indicates that drastic new tin controls may be forthcoming.

Zinc Supplies Remain Tight

Outlook for increased supplies of zinc are as grim today as they have been at any time since the present shortage developed. Purchases of foreign metal are at a standstill with fantastic offerings being made. Bids of 30.00c are being made regularly by various foreign buyers, but no sales have been made at this level. Zinc smelters continue to operate at record levels and expect to increase their workforce about 1 per cent by April over the yearend figure and to maintain it through June.

Foreign Lead Gets Premium

Users of lead will have to be content with only a partial coverage of their April requirements. Producers are working on their customers' allocations for that month, reserving a larger proportion of expected supplies for DO orders. They likely will close their books within a few days after opening them as they did on the March books. Competition in the world market continues keen with foreign buyers taking the bulk of available tonnages. The British Ministry of Supply purchased about 10,000 tons of Mexican lead for delivery in the last half of 1951 at a price of 19.00c a pound, according to trade reports. This compares with the current New York price of 17.00c.

Canada Bans Metal Scrap Export

Canadian government is holding to its policy of discontinuing export quotas for nonferrous scrap, reports the Canadian Secondary Materials Association, Toronto, Ont. Permit holders were granted at least 30 days in which to "clean up shipments" against permits outstanding on Mar. 1. All permits covering nonferrous scrap issued prior to Feb. 28, will be invalid after Mar. 31.

Cobalt Mining Stimulated

Deloro Smelting & Refining Co., Toronto, Ont., is acting as the Canadian government's buying agent in its three-year program to purchase cobalt at increased prices. The government's price schedule for ores and concentrates, as reported by C. D. Howe, Canadian trade minister, is: Ores containing between 10 and 11.99 per cent cobalt, $1.35 per pound for contained cobalt; 12 to 13.99 per cent cobalt, $1.40; 14 per cent or more cobalt, $1.45. The ores are being purchased on the basis of assay determination by Temiskaming Testing Laboratory, Cobalt, Ont.

Ajax-Northrup Induction Melting

"NO OTHER METHOD GETS SO MUCH OUT OF THE MOLTEN METAL"

Says I. E. Waechter, Chief Metallurgist, Alloy Precision Castings Company.

Users from all over the country praise the ability of Ajax-Northrup high frequency furnaces to give back what you put into them . . . no alloy loss, no carbon contamination . . . no off-analysis melts. Even the most difficult analyses, high in chromium, tungsten, nickel, and other "hard-to-handle" elements, are reproduced in melt after melt with unfailing precision!

Recovery of oxidizable alloys is phenomenally high . . . 98.5% chromium recovery reported by one user, 70 to 80% vanadium recovery by another. Savings in alloying elements and deoxidizers alone give Ajax-Northrup a two-to-one advantage in a nickel steel plant.

Ajax-Northrup furnaces are available in sizes from an ounce to a ton for non-ferrous and precious metals, to 8 tons for ferrous metals. Motor-generator units from 25 to 1200 kw. and up. Self tuning, trouble-free spark-gap converters from 3 to 40 kw. Just name your alloys and quantities—we'll send you the proper technical bulletins—free.

AJAX NORTHRUP

HEATING & MELTING

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NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic, 24.50c, Conn. Valley; Lake 24.62½c, delivered.

Brass Ingots: 85-5-5-5 (No. 115) 29.00c; 88-10-2 (No. 215) 43.25-44.50c; 80-10-10 (No. 305) 35.00c; No. 1 yellow (No. 405) 25.00-25.50c.

Zinc: Prime western 17.50c; brass special 17.75c; intermediate 18.00c, East St. Louis; high grade 18.85c, delivered.

Lead: Common 16.80c; chemical 16.90c; corroding 16.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 19.00c, pigs 18.00c. Base prices for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb c.l. orders.

Secondary Aluminum: Piston alloys 30.00-30.50c; No. 12 foundry alloy (No. 2 grade) 29.50-30.25c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 32.00c; grade 2, 30.00-30.25c; grade 3, 29.00-29.50c; grade 4, 28.50-29.00c. Prices include freight at c.l. rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt 140.00.

Antimony: American 99-99.8% and over but not meeting specifications below 42.00c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 42.50; f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 50.50c; 25-lb pigs, 53.15c; "XX" nickel shot, 54.15c; "F" nickel shot or ingots, for addition to cast iron, 51.00c. Prices include import duty.

Mercury: Open market, spot, large lots, New York, $216-$220 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $1.56 per lb of alloy, f.o.b., Reading, Pa.

Cadmium: "Regular" straight or flat forms, $2.55 del.; special or patented shapes $2.80.

Cobalt: 97.99%, $2.10 per lb for 500 lb (kegs); $2.12 per lb for 100 lb (case); $2.17 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.
Silver: Open market, New York 90.16c per oz.
Platinum: $90-$93 per ounce from refineries.
Palladium: $24 per troy ounce.
Iridium: $200 per troy ounce.
Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 41.03; yellow brass 37.84; commercial bronze, 95%, 40.99; 90%, 40.55; red brass, 85%, 39.59; 80%, 39.15; best quality, 39.15; nickel silver, 18%, 51.91-52.36; phosphor-bronze grade A, 5%, 60.20-62.82.

Rod: Copper, hot-rolled 36.88; cold-drawn 38.13; yellow brass free cutting, 32.23; commercial bronze, 95%, 40.68; 90%, 40.24; red brass 85%, 39.28; 80%, 38.84.

Seamless Tubing: Copper 41.07; yellow brass 40.85; commercial bronze, 90%, 43.21; red brass, 85% 42.50.

Wire: Yellow brass 38.13; commercial bronze, 95%, 41.28; 90%, 40.84; red brass, 85%, 39.88; 80%, 39.44; best quality brass, 39.44.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 28.67-30.295; l.c.l. 29.17-30.92; 100,000 lb lots 28.545-30.295; weatherproof, f.o.b. eastern mills, c.l. 29.60, l.c.l. 30.10, 100,000 lb lots 29.35; magnet, del., 15,000 lb or more 34.50, l.c.l. 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders.)

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	...	...
0.135-0.096	12-48	30.6	...	...
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	R317-T4	——Hexagonal—— 17S-T4
0.125	52.0	...	...
0.156-0.188	44.0	...	...
0.219-0.313	41.5	...	...
0.375	40.0	46.0	48.0
0.406	40.0	...	...
0.438	40.0	46.0	48.0
0.469	40.0	...	...
0.500	40.0	46.0	48.0
0.531	40.0	...	...
0.563	40.0	...	45.0
0.594	40.0	...	...
0.625	40.0	43.5	45.0
0.688	40.0	...	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	...	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	...	...
1.625	36.5	...	39.5
1.688-2.000	36.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 71.50c. Strip, cold-rolled, 77.50c. Rods and shapes, 67.50c. Plates, 69.50c. Seamless tubes, 100.50c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 57.00c. Strip, cold-rolled 60.00c. Rods and shapes, 55.00c. Plates, 56.00c. Seamless tubes, 90.00c. Shot and blocks, 50.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat untrimmed 37.69c; oval 37.19c. Cast 37.375c, delivered in eastern territory.

Copper Cyanide: 70-71% Cu, 100-lb drums, 1000 lb 60.8c, under 1000 lb 62.8c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 19.00c; 1000 to 19,900 lb, 18.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 200 lb, 29.25c; over 200 lb 28.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 68.50c; 10,000 to 30,000 lb, 69.50c; 3000 to 10,000 lb, 70.50c, 500 to 3000 lb 71.50c; 100 to 500 lb, 73.50c; under 100 lb, 76.50c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 35.00c; 400-lb bbl, 33.00c up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; ball, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers nom.; 100 or 300 lb drums only, 100 to 500 lb, nom.; 600 to 1900 lb, nom.; 2000 to 9900 lb, nom.; f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more drums 45.7c, f.o.b. Niagara Falls, N. Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb nom.; more than 2000 lb, nom., f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 400 lb bbl, nom.; 100 lb kegs nom., f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 20,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	23.00	23.00	22.25
Yellow Brass	20.125	19.875	18.75
Commercial Bronze			
95%	21.875	21.625	21.125
90%	21.75	21.50	21.00
Red brass			
85%	21.50	21.25	20.75
80%	21.375	21.125	20.625
Muntz metal	19.00	18.75	18.25
Nickel, silver, 10%	22.25	22.00	11.125
Phos. bronze, A	24.00	23.75	22.75

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 26.00-27.00; No. 2 copper 24.00-24.50; light copper 22.50-23.00; composition red brass 24.00-24.50; radiators 18.50-19.00; heavy yellow brass 18.50-19.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; refinery brass (60% copper) per dry copper content 19.50.

* Nominal.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 23.50; No. 2 22.00; light copper 20.00; No. 1 composition red brass 20.50-21.00; No. 1 composition turnings 20.00-20.50; mixed brass turnings 16.00; new brass clippings 17.50-18.00; No. 1 brass rod turnings 16.00-16.50; light brass 15.00; clean heavy yellow brass 17.00; new brass rod ends 16.50-17.00; auto radiators 17.00-17.25; cocks and faucets, 18.00-18.50; brass pipe 19.00-19.50.

Lead: Heavy 15.75-16.00; battery plates 9.25-9.50; linotype and stereotype 17.00; electrotype 15.75-16.00; mixed babbitt 17.00.

Zinc: Old zinc 11.50-12.00; new die cast scrap 11.50-12.00; old die cast scrap 8.00-8.25.

Tin: No. 1 pewter 80.00-85.00; block tin pipe 125.00; No. 1 babbitt 75.00-80.00.

Aluminum: Clippings 28, 19.50; old sheets 16.00; crankcase 16.00; borings and turnings 12.00-12.50.

DAILY PRICE RECORD

1951	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Mar. 8	24.50	16.80	17.50	140.00	19.00	42.00	50.50	90.16
Mar. 7	24.50	16.80	17.50	160.00	19.00	42.00	50.50	90.16
Mar. 6	24.50	16.80	17.50	174.50	19.00	42.00	50.50	90.16
Mar. 5	24.50	16.80	17.50	179.50	19.00	42.00	50.50	90.16
Mar. 2-3	24.50	16.80	17.50	181.75	19.00	42.00	50.50	90.16
Mar. 1	24.50	16.80	17.50	181.50	19.00	42.00	50.50	90.16
Feb. Avg.	24.50	16.80	17.50	182.716	19.00	42.00	50.50	90.16
Feb. 28	24.50	16.80	17.50	182.00	19.00	42.00	50.50	90.16
Feb. 26-27	24.50	16.80	17.50	182.625	19.00	42.00	50.50	90.16
Feb. 13-24	24.50	16.80	17.50	183.00	19.00	42.00	50.50	90.16
Feb. 1-10	24.50	16.80	17.50	182.50	19.00	42.00	50.50	90.16
Jan. Avg.	24.50	16.80	17.50	171.798	19.00	35.462	50.50	88.890
Jan. 29-31	24.50	16.80	17.50	188.00	19.00	42.00	50.50	90.16

NOTE: Copper; Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

CEILING PRICES, IRON AND STEEL SCRAP

Prices as set forth in Office of Price Stabilization ceiling price regulation No. 5, effective Feb. 7, 1951.

STEELMAKING SCRAP COMPOSITE

Mar. 8	$44.00
Mar. 1	44.00
Feb. 1951	44.00
Mar. 1950	28.23
Mar. 1946	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

Basing point ceiling prices per gross ton from which maximum shipping prices are computed on scrap of dealer and industrial origin; and from which ceiling on-line and ceiling delivered prices are computed on scrap of railroad origin.

No. 1 Heavy Melting Steel (Grade 1)

Basing Point	Dealer, Industrial	Railroad
Alabama City, Ala.	$39.00	$41.00
Ashland, Ky.	42.00	44.00
Atlanta, Ga.	39.00	41.00
Bethlehem, Pa.	42.00	44.00
Birmingham, Ala.	39.00	41.00
Brackenridge, Pa.	44.00	46.00
Buffalo, N. Y.	43.00	45.00
Butler, Pa.	44.00	46.00
Canton, O.	44.00	46.00
Chicago, Ill.	42.50	44.50
Cincinnati, O.	43.00	45.00
Claymont, Del.	42.50	44.50
Cleveland, O.	43.00	45.00
Coatesville, Pa.	42.50	44.50
Conshohocken, Pa.	42.50	44.50
Detroit, Mich.	40.00	42.00
Duluth, Minn.	40.00	42.00
Harrisburg, Pa.	42.50	44.50
Houston, Tex.	37.00	39.00
Johnstown, Pa.	44.00	46.00
Kansas City, Mo.	39.50	41.50
Kokomo, Ind.	42.00	44.00
Los Angeles	35.00	37.00
Middletown, O.	43.00	45.00
Midland, Pa.	44.00	46.00
Minnequa, Colo.	38.00	40.00
Monessen, Pa.	44.00	46.00
Phoenixville, Pa.	42.50	44.50
Pittsburg, Calif.	35.00	37.00
Pittsburgh, Pa.	44.00	46.00
Portland, Oreg.	35.00	37.00
Portsmouth, O.	42.00	44.00
St. Louis, Mo.	41.00	43.00
San Francisco	35.00	37.00
Seattle, Wash.	35.00	37.00
Sharon, Pa.	44.00	46.00
Sparrows Point, Md.	42.00	44.00
Steubenville, O.	44.00	46.00
Warren, O.	44.00	46.00
Weirton, W. Va.	44.00	46.00
Youngstown, O.	44.00	46.00

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 heavy melting steel) for other grades of dealer and industrial scrap.

Open-hearth and Blast Furnace Grades

2. No. 2 Heavy Melting	—$2.00
3. No. 1 Busheling	Base
4. No. 1 Bundles	Base
5. No. 2 Bundles	— 3.00
6. Machine Shop Turnings	—10.00
7. Mixed Borings & Short Turnings	— 6.00
8. Shoveling Turnings	— 6.00
9. No. 2 Busheling	— 4.00
10. Cast Iron Borings	— 6.00

Electric Furnace and Foundry Grades

11. Billet, Bloom & Forge Crops	+ 7.50
12. Bar Crops & Plate Scrap	+ 5.00
13. Cast Steel	+ 5.00
14. Punchings & Plate Scrap	+ 2.50
15. Electric Furnace Bundles	+ 2.00
Cut Structurals & Plate:	
16. 3 feet and under	+ 3.00
17. 2 feet and under	+ 5.00
18. 1 foot and under	+ 6.00
19. Briquetted Cast Iron Borings	Base
20. Foundry Steel, 2 feet and under	+ 2.00
21. Foundry Steel, 1 foot and under	+ 4.00
22. Springs and Crankshafts	+ 1.00
23. Alloy Free Turnings	— 3.00
24. Heavy Turnings	— 1.00

Special Grades

25. Briquetted Turnings	Base
26. No. 1 Chemical Borings	— 3.00
27. No. 2 Chemical Borings	— 4.00
28. Wrought Iron	+10.00
29. Shafting	+10.00

Restrictions on Use

(1) Prices for Grades 11, 23 and 24 may be charged only when shipped to a consumer directly from an industrial producer of such grades; otherwise ceiling prices shall not exceed prices established for the corresponding grades of basic open-hearth and blast furnace scrap.
(2) Prices established for Grades 26 and 27 may be charged only when such grades are sold for use for chemical or annealing purposes; otherwise ceiling prices for such grades shall not exceed the price established for Grade 10.
(3) Prices established for Grade 28 may be charged only when sold to a producer of wrought iron; otherwise ceiling price for such grade shall not exceed the ceiling price established for the corresponding grade of basic open-hearth.

Special Pricing Provisions

(1) Sellers of Grades 26 and 27 may make an extra charge of $1.50 per ton for loading in box cars, or 75 cents per ton for covering gondola cars with a weather-resistant covering.
(2) Ceiling price of pit scrap, ladle scrap, salamander scrap, skulls, skimmings or scrap recovered from slag dumps and prepared to charging box size, shall be computed by deducting from the price of No. 1 heavy melting steel of dealer and industrial origin, the following amounts: Where iron content is 85% and over, $4; 75% and over, $6; less than 75%, $10.
(3) Ceiling price of any inferior grade of scrap not listed shall not exceed the price of No. 1 heavy melting steel less $15.

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 railroad heavy melting steel) for other grades of railroad steel scrap.

2. No. 2 Heavy Melting Steel	—$2.00
3. No. 2 Steel Wheels	Base
4. Hollow Bored Axles	Base
5. No. 1 Busheling	— 3.50
6. No. 1 Turnings	— 3.00
7. No. 2 Turnings, Drillings & Borings	—12.00
8. No. 2 Cast Steel	— 6.00
9. Uncut Frogs, switches	Base
10. Flues, Tubes & Pipes	— 8.00
11. Structural, Wrought Iron and/or steel, uncut	— 6.00
12. Destroyed Steel Cars	— 8.00
13. No. 1 Sheet Scrap	— 9.50
14. Scrap Rails, Random Lengths	+ 2.00
15. Rerolling Rails	+ 7.00
Cut Rails:	
16. 3 feet and under	+ 5.00
17. 2 feet and under	+ 6.00
18. 18 inches and under	+ 8.00
19. Cast Steel, No. 1	+ 3.00
20. Uncut Tires	+ 2.00
21. Cut Tires	+ 5.00
22. Uncut Bolsters & Side Frames	Base
23. Cut Bolsters & Side Frames	+ 3.00
24. Angle & Splice Bars	+ 5.00
25. Solid Steel Axles	+12.00
26. Steel Wheels, No. 3 oversize	Base
27. Steel Wheels, No. 3	+ 5.00
28. Spring Steel	+ 5.00
29. Couplers & Knuckles	+ 5.00
30. Wrought Iron	+ 8.00

Restrictions on Use

(1) Price established for Grade 15 may be charged only when purchased and sold for rerolling uses; otherwise, ceiling price for such grade shall not exceed ceiling price established for Grade 14.
(2) Price established for Grade 30 may be charged only when sold to a producer of wrought iron; otherwise, ceiling price for such grade shall not exceed ceiling price established for No. 1 heavy melting steel.

CAST IRON SCRAP

Ceiling price per gross ton for any of the following grades of cast iron scrap shall be the price shown in the following table, f.o.b. shipping point.

1. Cast Iron, No. 1 (Cupola Cast)	$49.00
2. Cast Iron, No. 2 (Charging Box Cast)	47.00
3. Cast Iron, No. 3 (Heavy Breakable Cast)	45.00
4. Cast Iron, No. 4 (Burnt Cast)	41.00
5. Cast Iron Brake Shoes	41.00
6. Stove Plate	46.00
7. Clean Auto Cast	52.00
8. Unstripped Motor Blocks	43.00
9. Wheels, No. 1	47.00
10. Malleable	55.00
11. Drop Broken Machinery Cast	52.00

Restrictions on Use

(1) Ceiling shipping point or on-line price which a basic open-hearth consumer may pay for No. 1 cast iron, No. 1 wheels, clean auto cast or malleable shall be the ceiling price established for No. 3 cast iron.
(2) Ceiling shipping point or on-line price which any foundry consumer other than a malleable iron producer may pay for Grade 10 shall be the ceiling price established for No. 1 cast iron.

Preparation Charges

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of dealer or industrial origin which is allocated by the National Production Authority to a consumer, shall be as follows:
(1) For preparing into Grades No. 1, No. 2 or No. 3, $8.
(2) For hydraulically compressing Grade No. 4, $6 per ton; Grade No. 5, $8.
(3) For crushing Grade No. 6, $3.
(4) For preparing into Grade No. 25, $6.
(5) For preparing into Grade No. 19, $6.
(6) For preparing into Grade No. 12, Grade No. 13, Grade No. 14, or Grade No. 18, $10.
(7) For preparing into Grade No. 17 or Grade No. 21, $10.
(8) For preparing into Grade No. 16 or Grade No. 20, $10.
(9) For hydraulically compressing Grade No. 15, $8.
(10) For preparing into Grade No. 28, $10.

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of railroad origin shall be as follows:
(1) For preparing into Grade No. 1 and Grade No. 2, $8.
(2) For hydraulically compressing Grade No. 13, $6.
(3) For preparing into Grade No. 16, $4.
(4) For preparing into Grade No. 17, $5.
(5) For preparing into Grade No. 18, $7.
(6) For preparing into Grade No. 21, $4.
(7) For preparing into Grade No. 23, $4.

Ceiling fees per gross ton which may be charged for intransit preparation of cast iron shall be limited to the following:
(1) For preparing Grade No. 8 into Grade No. 7, $9.
(2) For preparing Grade No. 3 into Grade No. 1, $4.

Whenever scrap has arrived at its point of delivery and the consumer engages a dealer to prepare such scrap, no fee may be charged for such services unless the consumer obtains prior written approval from OPS.

No preparation charge other than the charges set forth above may be made for the preparation of any grade of iron or steel scrap unless the consumer has secured prior written approval of such charges from OPS.

Commissions

No commissions shall be payable except by a consumer to a broker for brokerage services rendered. Where scrap is allocated by NPA other than from a government agency, the seller may designate a broker. Where scrap is allocated by NPA from a governmental agency, the consumer may designate a broker. In the event a broker purchases scrap for sale to a consumer, such consumer may pay such broker a commission not exceeding $1 a ton.

Unprepared Scrap

The term "unprepared scrap" shall not include such demolition projects as bridges, box cars or automobiles, which must be so priced that the prepared scrap will be delivered to the consumer within the established ceiling delivered prices.

For unprepared steel scrap other than materials suitable for hydraulic compression, the ceiling basing point prices shall be $8 per gross ton beneath the established ceiling price of the prepared base grades, No. 1 heavy melting or No. 1 railroad heavy melting steel.

For unprepared material which when compressed constitutes No. 1 bundles the ceiling basing point price shall be $6 per gross ton beneath the ceiling basing point price for No. 1 bundles; or when compressed constitutes No. 2 bundles the ceiling basing point price shall be $8 per ton beneath the ceiling basing point price for No. 2 bundles.

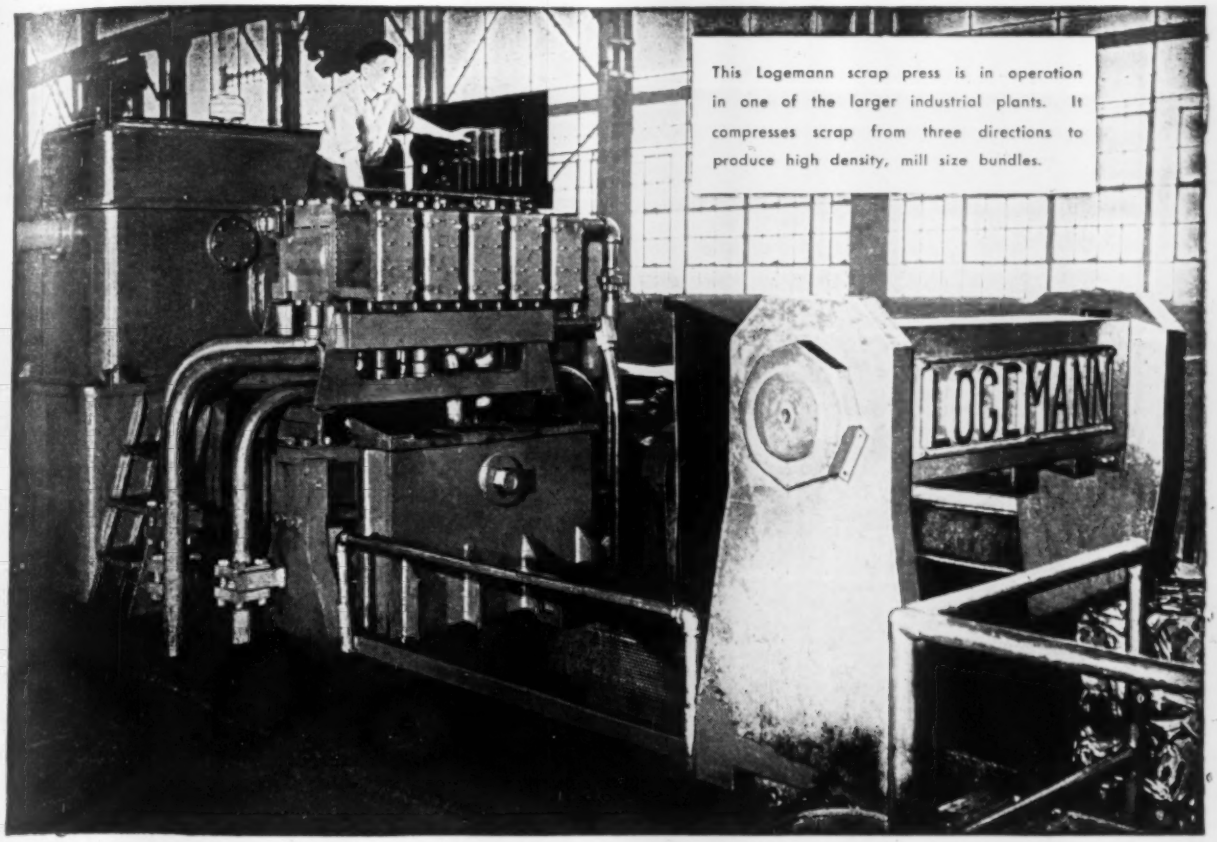
Any iron casting which cannot be broken with an ordinary drop into Grade No. 2 or Grade No. 1 may not be classified as Grade No. 3. Where such iron casting requiring blasting or other special preparation is sold to a consumer of scrap, the shipping point price for Grade No. 3 must be reduced by the amount of the additional charges required for preparation.

Premiums for Alloy Content

No premium may be charged for alloy content except: $1.25 per ton for each 0.25% of nickel where scrap contains not less than 1% and not over 5.25% nickel; $2 per ton for scrap containing not less than 0.15 per cent molybdenum and $3 for scrap containing not less than 0.65% molybdenum; for scrap containing not less than 10% manganese, $4 for scrap in sizes larger than 12 x 24 x 8 in., and $14 for scrap cut in that size or smaller (applicable only if scrap is sold for electric furnace use or on NPA allocation); $1 for scrap conforming to SAE 52100 when sold for electric furnace use only.

Switching Charges

Switching charges to be deducted from basing point prices of dealer, industrial and nonoperating railroad scrap, to determine ceiling shipping point prices for scrap originating in basing points are per gross ton:
Alabama City, Ala., 43c; Ashland, Ky., 47c; Atlanta, 51c.
Bethlehem, Pa., 52c; Birmingham, 50c; Brackenridge, Pa., 53c; Buffalo, 83c; Butler, Pa., 65c.
Canton, O., 51c; Chicago (including Gary, Ind.), $1.34c; Cincinnati (including Newport, Ky.), 65c; Claymont, Del. (including Chester, Pa.), 79c; Cleveland, 76c.
Coatesville, Pa., 50c; Conshohocken, Pa., 20c.
Detroit, 95c; Duluth, Minn., 50c.
Harrisburg, Pa., 51c; Houston, Tex., 57c.
Johnstown, Pa., 75c.
Kansas City, Mo., 78c; Kokomo, Ind., 51c.
Los Angeles (including Firestone switching district), 66c.
Middletown, O., 26c; Midland, Pa., 75c; Minnequa, Colo., 33c; Monessen, Pa., 51c.
Phoenixville, Pa., 51c; Pittsburg, Calif., 65c; Pittsburgh (including Bessemer, Homestead, Duquesne, Munhall), 99c; Portland, Oreg., 52c; Portsmouth, O., 51c.
St. Louis (including Granite City, E. St. Louis, Madison, Ill.), 51c; San Francisco (including So. San Francisco, Niles, Oakland), 66c; Seattle, 59c; Sharon, Pa., 75c; Sparrows Point, Md., 20c; Steubenville, O., 51c.
Warren, Pa., 75c; Weirton, W. Va., 70c.
Youngstown, 75c.



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Sheets, Strip . . .

Sheet and Strip Prices, Page 145 & 146

Cleveland—Not much, if any, improvement in sheet supply conditions is expected to result from the cutback in tonnage to consumer durable goods beginning second quarter. While the 20 per cent reduction in steel supply to such uses is substantial it will be more than taken up by the increase in defense requirements. The recent increase in the DO set-aside tonnage is believed just a start to increasingly larger tonnage for military purposes with defense programs speeding up. Manufacturers forced to curtail output of civilian goods are expected to add to the defense load on the mills as they find a niche in the armament program.

Pittsburgh—Projected cutbacks in supplies of steel for consumer durable goods beginning second quarter will not materially ease the stringency in light, flat-rolled products. For one thing, overall supply of sheets and strip today is not equal to that during the base period, first half of 1950, on which mill set-aside tonnage for DO account is reckoned. This is because a much larger tonnage of light plates currently is being rolled on continuous mills than was the case a year ago. Consequently, cutbacks in sheet shipments to appliance makers and auto builders, scheduled at 20 per cent for second quarter and 30 per cent for third, will be more than offset by the recent increases in DO set-asides to 17 per cent on hot-rolled sheets, 15 per cent on cold-rolled, and 12 per cent on hot and cold-rolled strip.

Cincinnati—Excepting on rated tonnage, district sheet mills are holding to month-by-month schedules as a means of holding down carryover. Allocations for consumers without ratings are lower for April.

Boston—Rated schedules on hot-rolled sheets in general are one month to six weeks beyond cold-rolled. This holds for carbon as well as specialties with some hot-rolled tonnage now booked beyond July. Both sheets and strip are booked over set-aside limitations for rated volume and May allocations to unrated consumers will be lower. This holds for electrical sheets and strip. Nonintegrated cold-rolled units are revising schedules frequently in line with hot strip available. Heavy pressure for hot-rolled sheets has set back tack plate.

Chicago—A local sheet producer is unable to book DO hot rolled sheets until May, 1952, its capacity for this item under NPA maximum quota being fully occupied until that time. Other items are less extended in delivery. First DO openings for galvanized sheets and enameling iron are June, cold-rolled sheets, September, and October for some sizes of hot rolled strip, November for others. Feeling is that DO maximums may undergo further upping before lead time for May expires.

Birmingham—Sheet users are not relaxing their efforts to get a few more tons although the supply situation has reached an impasse in that there is no way to squeeze in a few extra tons for one customer except at the sacrifice of another.

Los Angeles—Some fabricators are getting better flat-rolled deliveries without DO's. A fabricator whose DO business is only 1 per cent of total backlog receives allocated, non-rated sheet tonnage in 3 to 4 months, waits 6 to 8 months for rated tonnage. Allocations, however, are down 33 per cent.

Plates . . .

Plate Prices, Page 145

Pittsburgh—Larger tonnage of light plates is being produced on continuous sheet mills but demand has not attained volume anything comparable to that in World War II. In fact, some steelmakers do not anticipate being called upon to provide anything like the plate tonnage taken for shipbuilding during the last war. However, ship construction and repair needs are due for expansion with allocations totaling around 75,000 tons monthly for shipbuilding and repairs being set up for May.

Substantial part of this tonnage will be plates. Expectations are a part of the total will come from the continuous mills. Meanwhile, the cutback in the railroad car program to 9000 units from 10,000 in May will provide only minor relief for the platemakers, and such as it is, it will be shortlived since it is reported the schedule will be increased again to 10,000 units in June.

Boston—Five district shops quoted on a large inquiry for Navy barges, expected to be distributed shortly. This inquiry brought out a large number of estimates. Specific projects are taking more plate tonnage, including 1075 tons, storage tanks, Fall River, Mass., and Groton, Conn. Bethlehem Quincy Yard has added a 28,000 ton tanker to its shipbuilding backlog. Lighter plates for May allocation are at low point with bulk going to rated commitments. Rolled armor plate and low alloy high strength grades are taking more overall capacity.

New York—Some platemakers are now into July on DO-rated orders, with others largely booked up for June. This situation, however, may ease should enlarged quotas, now under consideration, be made effective. May allocations will be finished this week on non-rated orders. Every indication points to a sharp drop in the volume because of expanding defense requirements.

Philadelphia—Plate producers are closing books late this week on May rollings, entering much more preference work than heretofore and at the expense of non-rated consumers. So much preference tonnage is coming out strip producers are being called upon to divert more of their output to strip-plate. Effective Mar. 6, Worth Steel Co. became the Claymont Steel Corp., subsidiary of the Colorado Fuel & Iron Corp.

Cleveland—Plate sellers have little tonnage available even for DO account before third quarter. The rising volume of defense business is cutting steadily into allotments for non-rated customers and all the signs point to progressive worsening of supply for the general trade. Expectations are increasing light plate tonnage demand over coming months will cut sharply into sheet rolling time on the continuous mills.

Steel Bars . . .

Bar Prices, Page 145

New York—Non-rated consumers of hot carbon bars look for rather sharp curtailments in their May allotments from the mills. These allotments should be completed by Mar. 15, 45 days before the start of May. This expected curtailment will come as a result of the heavier directive programs set up for May and a heavier volume of DO orders. If immediate action is taken by Washington in further increasing mill quotas for DO-rated orders, it will catch May allocations and result in a still further decline in non-rated business for that month.

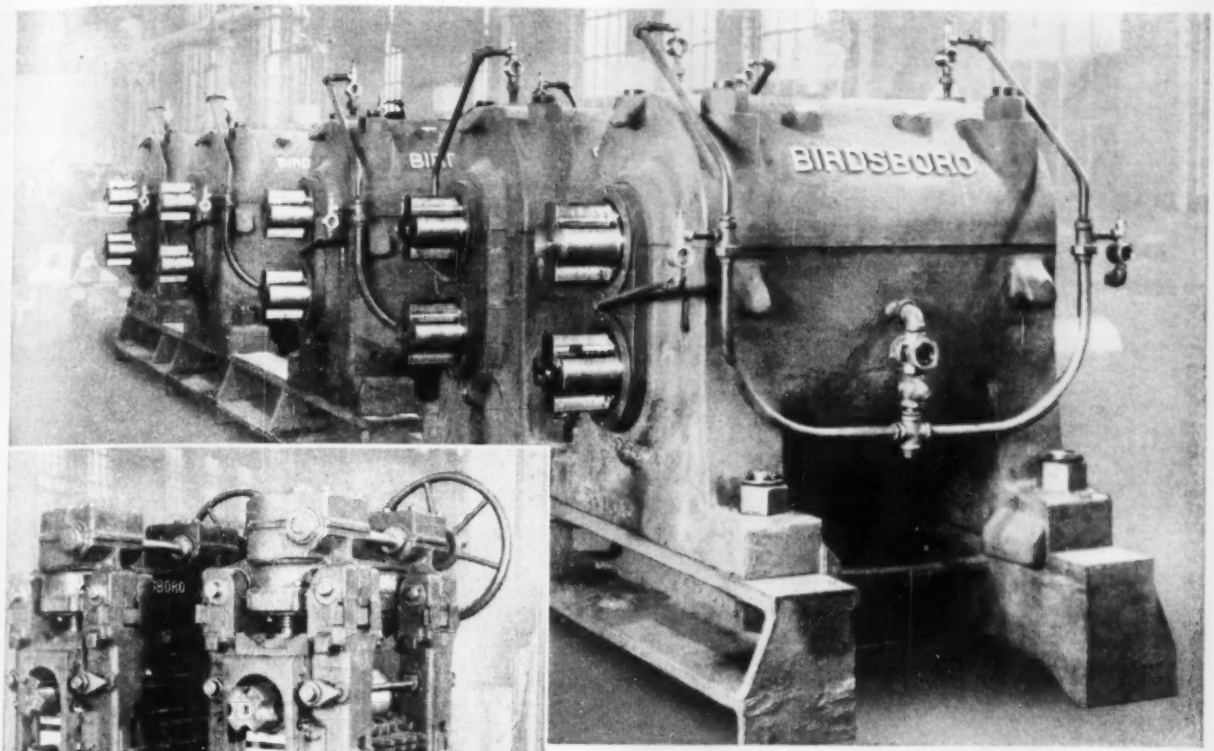
Boston—Heavy demand for alloy bars, with volume of rated orders increasing, is complicated by growing restrictions on alloy materials, nickel, tungsten, chromium and molybdenum. For civilian use, orders are not only difficult to place, but wanted physical and chemical specifications are narrowing. Ahead looms a wave of substitutions to leaner alloys for both defense and civilian use. Hot-rolled allocations for May to commercial consumers are taking the deepest cut since rearmament started. Forge shops are booking more rated orders, both direct and through subcontracts.

Philadelphia—DO ratings extend into August and September on alloy bars in many instances, into July and August on cold carbon and July on hot carbon. Allocations this week of non-rated tonnage for May will reflect a sharp cut. Producers are virtually through July on DO-rated business in hot and cold carbon sheets and well beyond in galvanized and certain specialties, particularly electrical sheets. DO-acceptances on stainless fall principally in July and August.

Pittsburgh—With military requirements taking an increasingly larger share of bar output tight supply conditions in this area of the market are expected to intensify steadily. Recent increase in tonnage set-aside for DO account is seen as only the beginning of a gradual expansion in military take. Whether the cutback in civilian goods beginning second quarter, scheduled at 20 per cent of steel use in the first half of 1950, will materially ease supply conditions in the bar market is uncertain. Most barmakers had booked DO tonnage for the period beyond the minimum limits of the former set-aside so that it would appear not much tonnage will be released for second quarter by the civilian goods curtailment.

Cleveland—Barmakers are wrestling with an increasingly difficult supply situation. Heavier military demands will necessitate further cutbacks in tonnage to unrated consumers before end of second quarter. Some mills already are booked well into summer on DO tonnage and expectations are mill set-aside for DO account will likely be stepped up to accommodate rising defense needs before many weeks pass. As a result, the cutback in supplies to durable consumer goods manufacturers beginning in April is not expected to effect much change in the overall supply picture.

Chicago—Considerable demand is



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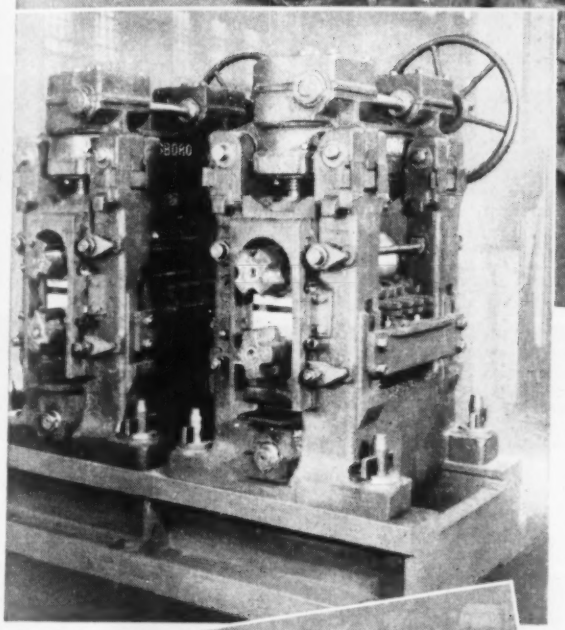

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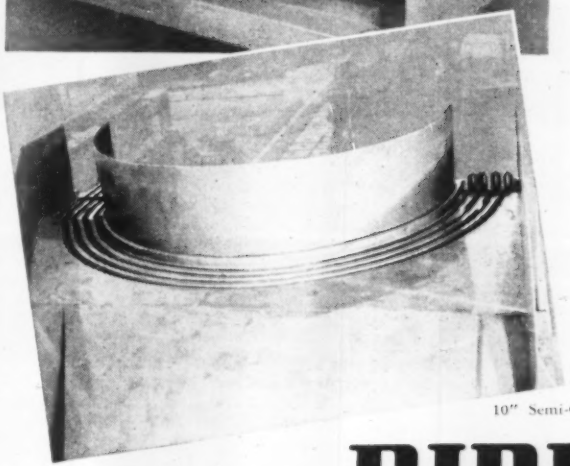

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reported for cold-finished bars. Supply is far short of unrated requirements. For alloy bars, May is the first month one mill can take additional DO tonnage. Under the NPA maximum quota, carbon bars are listed for the June-July rolling cycle, and rail steel bars in June.

Seattle—Heavy backlogs and continued demand for all steel items are reported by rolling mills. Output at Northwest Steel Rolling Mills' plant is limited by shortage of ingots.

Semifinished Steel . . .

Semifinished Prices, Page 145

Pittsburgh—Ingot operations in this district last week rose to the highest level since last December being estimated at a 101 per cent clip. In the second last week of December the rate hit 102 per cent. Only two out of 47 blast furnaces in the district currently are idle. All of which means production of semifinished steel in this district is being pushed at capacity pace. Shipments from the mills have not fully recovered from the car shortage resulting from the recent traffic dislocation attending the switchmen's strike.

Structural Shapes . . .

Structural Shape Prices, Page 145

Chicago—Lighter structurals are in stronger demand than the heavier sections. This is reflected in openings available for DO orders. Under NPA set-aside maximum for defense use, May is the first month that one local shape maker can book additional DO orders for heavy shapes, June is the first month for the light ones. For a coal dock at the new Oak Creek power plant in Milwaukee, 1080 tons of German steel piling were purchased. A portion has already arrived in New York for rail shipment to the site. It is explained this was the only source for prompt delivery and permitted construction of the dock to begin immediately. The piling ranges in length from 40 to 44 feet and is 15¾ inches wide.

Boston—Bridge inquiry is heavier, close to 10,000 tons being estimated with 7000 tons, Charleston Central Artery, Boston, postponed to Apr. 3. Multiple truss span, Merrimac river, Amesbury-Newburyport, closes same date. Connecticut is also opening on the first of 1951 bridge program Mar. 26. Except for schools and hospjtals, building requirements are light with outlook for defense expansions limited. Lack of plain material is restricting operations with some larger shops. Light angles are notably tight due to direct government contracts.

New York—While structural work is light, pending clarification of government controls on construction, plans have been drawn for several large jobs. One is the proposed Harlem river bridge of the New York Central, involving close to 20,000 tons of structural steel. Bids on the substructure will be closed late this month, with bids on the superstructure likely to be taken early in June. Another large project that might become active in June is an 18,000-ton viaduct on South street, this city.

Buffalo—With delivery dates on structural steel extended, builders report an influx of concrete reinforcing work in this area. Shipments on shapes for smaller jobs are coming through on a reasonable 4-to-6 week delivery basis, but tonnages for larger jobs are extended to November and December, according to contractors.

Philadelphia—Structural demand continues spotty, and the majority of such relatively few outstanding contracts as are being placed involve industrial work. However, fabricators still have heavy backlogs.

Cincinnati—Contracts for fabrication of structural steel, buildings, Atomic Energy Commission, Paducah, Ky., have been placed by F. H. McGraw & Co., contractor-engineers, with Virginia Bridge Co., Roanoke, Va.; International Steel Co., Evansville, Ind., and Bristol Steel & Iron Co., Bristol, Va. Several thousand tons of steel are required, including concrete bars being supplied by Bethlehem Steel Co., United States Steel Co. and United States Steel Supply Co.

Los Angeles—Operations of fabricators, while not yet retarded due to lack of steel, are severely hampered. Despite uncertainties and materials shortages, Southern California Edison Co. plans $60.5 million of construction in 1951, only 3.3 per cent less than last year.

San Francisco—Actual and projected building is keeping the scheduling "tight" on structural steels.

Seattle—Largest fabricator in this area has a six months' backlog. Other plants are busy in spite of increasing shortages of steel. Pacific Car & Foundry Co. is stepping up operations at its Renton plant as production begins on a large order for railroad cars.

Tin Plate . . .

Tin Plate Prices, Page 146

Pittsburgh—Tin plate makers are hoping for some increase in tin allocations to permit them to satisfy all of the requirements for plate permitted under government regulations. Tin allocations for permitted uses, they say, are not nearly enough even with resort to lighter coated plate and other measures designed to spread out available tin supply as far as possible. Last week the local trade expressed interest in suspension of government tin purchasing for stockpiling until prices drop to more reasonable levels. Private industry purchasing is not affected. Some interests feel suspension of government buying will have a salutary effect, pointing out that from the standpoint of tin supply this country is in better position today than it was at the time of Pearl Harbor and that a showdown on the price question probably is more feasible today than is likely to be the case later on.

Cleveland—Suspension of government purchasing of tin for the national stockpile is viewed favorably by tin plate producers. The latter's purchases are not affected and they see more reasonable prices resulting from the government's action.

Tin plate makers are not too worried with respect to second quarter production during which period they will be able to use 95 per cent of their average tin use in first half of last year. They are more concerned for third quarter. Meanwhile cutback in use of tin for certain types of containers is resulting in a rush on black plate as can users seek a suitable substitute for tin coated cans. In this trend to black plate some producers see a threat to capacity operation of their electrolytic tinning lines.

Chicago—Hot dip tin plate, terne and black plate on DO ratings can still be supplied in May by one local tin plate producer. First opening for DO electrolytic tin plate, however, is July.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 145

Pittsburgh—Restrictions on commercial building have not resulted in any noticeable reduction in demand for reinforcing steel in this district. Considerable construction under way here is providing a constant drain on available supply of bars. Highway building and repairs now loom immediately ahead with spring just around the corner, and, as a result, fabricators anticipate no substantial letdown in activity over coming months. U.S. Steel Supply Co. has acquired larger quarters for its concrete bar fabricating activities. It has taken over a 70 x 800 ft. building in McKees Rocks formerly occupied by the Pressed Steel Car Co.

Chicago—Contracts for aircraft landing mats, totaling $20 million, have been placed by Corps of Engineers, Chicago procurement office, as follows: Ceco Steel Products Co., Chicago; Highway Steel Products Co., Chicago Heights, Ill., Inland Steel Products Co., Milwaukee; Clark Grave Vault Co., Columbus, O.; National Gypsum Co., Buffalo, and Morton Mfg. Co., Chicago.

Wire . . .

Wire Prices, Page 147

Boston—Most wire products are tightening, even rope. Strong demand and limited rod supply contribute to limited quotas. Rated orders are heaviest for alloys with some substitutions appearing in specifications. Deferments are appearing on automotive specialties, but aircraft demand is mounting.

Tubular Goods . . .

Tubular Goods Prices, Page 148

Los Angeles—Municipal and state pipeline projects planned one to two years ahead despite materials shortages sustain demand for pipe and skelp. Kaiser Steel Corp. allocated pipe tonnage through second quarter.

Pittsburgh—L. B. Foster Co., will furnish 25,000 lineal feet of handrailing, fabricated from steel pipe, for power plants under construction by affiliates of American Gas & Electric Service Corp.: Indiana & Michigan Electric Co., Tanners Creek plant, Lawrenceburg, Ind.; Appalachian Electric Power Co., Kanawha River plant, Glasgow, W. Va.; Ohio Power Co., Muskingum River plant, Beverly, O.

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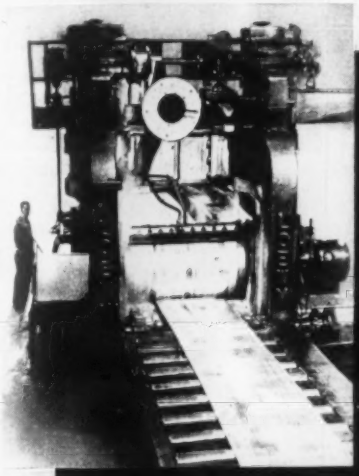
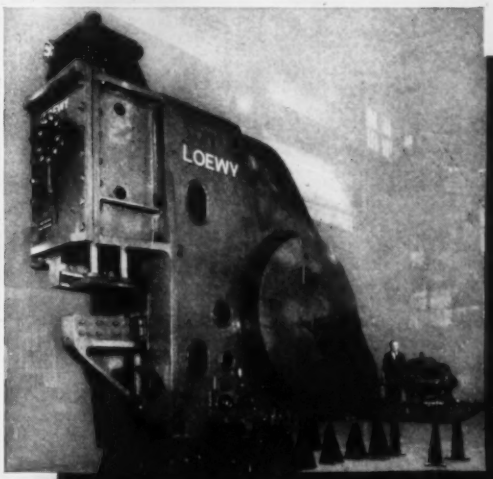
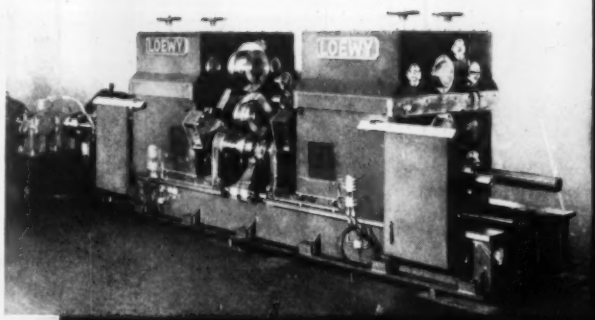


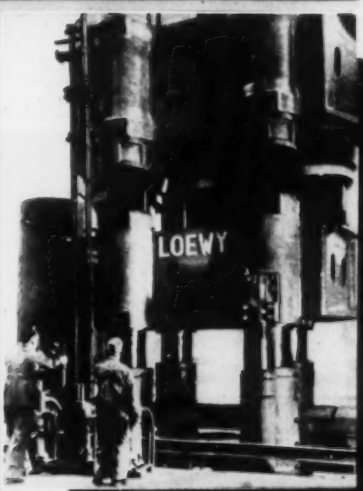
2-HIGH HOT ROLLING MILL



1150 TON UP-CUT BLOOM AND SLAB SHEAR



ROTARY SIDE TRIMMING SHEAR WITH ADJUSTABLE KNIVES AND SCRAP CUTTER



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Metallurgical Coke . . .

Metallurgical Coke Prices, Page 148

Chicago — Coke supply is more troublesome to foundries than metallics but it is still somewhat short of the critical stage. Suppliers are doing a good job of keeping shipments moving this being a necessity because inventories are low. When hot spots develop beehive coke from the East is offered. There are some instances, however, where foundries are using half beehive and half oven fuel in their mixes and balk at increased use of beehive. Shipping conditions continue to improve from the recent rail strike disruption.

Pig Iron . . .

Pig Iron Prices, Page 144

Cleveland—Merchant pig iron sellers are under strong pressure for tonnage but so far they have been able to so distribute available supply no foundries in this area have been forced to severely curtail operations. However, some that could increase their melt are hesitant to enlarge schedules lacking assurance of adequate iron, scrap and coke supplies. The supply situation, however, has not yet become so acute as to warrant imposition of strict government allocations in the opinion of trade authorities. How long such allocations can be deferred is another matter with DO castings orders rising. Foundrymen generally view the outlook gloomily with one merchant blast furnace in this general district down for relining and another scheduled to go down for similar repairs in September. Recent blowing out of one Jones & Laughlin stack in Cleveland for repairs had no effect on the merchant market since this stack was on basic iron. Currently, 8 out of 9 stacks in the immediate Cleveland area are in blast.

Boston — At current output foundries are obtaining sufficient iron to maintain operations, but most would take on additional tonnage if available within inventory limitations. Relatively little defense work has been booked, but an increasing volume in the form of subcontracts is likely as restrictions on other materials entering into finished products tighten. Jobbing foundry finished castings are up an average of 10 per cent over one year ago.

New York—While some confusion exists, it appears pig iron consumers can add foreign iron to their inventories in excess of the 30 to 45-day supply allowed by the governm.. '. Where inventories are comprised mostly of foreign iron they cannot add beyond the regulation limits further stocks of domestic iron, however. Incidentally, this makes it difficult for consumers to average down their prices for iron, foreign being more expensive than domestic. Meanwhile, the building freeze is backing up on pipemakers, who for the past many months have been heavy consumers of iron. This situation may free some iron for other purposes in the fairly near future, some trade interests believe.

Buffalo—Much tighter supply conditions prevail in merchant pig iron, urgent demand reflecting an increased volume of government contracts placed in this area. Hopes are held for an early opening of lake navigation to eliminate some of the problems now caused by freight car shortages.

Philadelphia—Pig iron is increasingly scarce and most consumers believe it is just a question of time until widespread allocations will be necessary. Imports are off due in part to a shortage of ships. The Chester, Pa., furnace is still out of operation because of shortage of ore and coke.

Pittsburgh—Merchant suppliers are under increasing pressure from the foundries for pig iron with defense orders for castings beginning to come out in larger volume. However, there is no excess iron available anywhere. The one strictly merchant producer here is turning away numerous requests for tonnage coming from foundries outside the immediate Pittsburgh district.

Foundries are increasingly dependent on scrap to sustain melts, but a serious shortage of cast scrap is reported developing. With pig iron supply short and scrap scarce the foundries increasingly see government allocation of available pig iron as the only way out of their supply predicament.

U.S. Steel Co. last week blew out Carrie No. 1 blast furnace for partial relining, but it blew in its No. 1 stack at Edgar Thomas works at Braddock. This stack had been down since November for relining. It has production capacity of 460,000 tons annually. Pittsburgh Steel Co. on Mar. 1 blew out its No. 2 stack for repairs. It will be out of blast at least a month. Currently 45 out of 47 blast furnaces in the district are engaged.

Cincinnati—Furnace interests are spreading available pig iron tonnage to old customers, allotments being based on consuming records of the past.

Chicago — Although foundry iron supply is notably short of demand the situation has not yet become critical. Imports and extensive use of scrap enable foundries to operate without serious curtailments. However, each passing month dims the outlook. Of this district's 42 blast furnaces 41 are operating. On Mar. 8 United States Steel Co. relighted its Gary No. 9 stack, down since Dec. 17 for relining. Inland Steel Co.'s Indiana Harbor "B" furnace, down since Nov. 30 for relining, resumed operation Feb. 22 and for a brief period is producing spiegeleisen. However its "A" furnace went down Mar. 10 and will be idle until ore supply is replenished by opening of the lake shipping season.

Birmingham—Industrial activity in this district is measured in terms of availability of pig iron and there is not enough iron for capacity operation.

Fluorspar . . .

Fluorspar Prices, Page 148

Fallon, Nev.—H. W. Gould Co., San Francisco, will construct a fluorspar plant between Gabbs and Broken Hills, Nevada. Capacity will be about 150 tons daily.

Iron Ore . . .

Iron Ore Prices, Page 149

Cleveland—Shipping on the Great Lakes is off to an early start. The local port was opened about 10 days ago with the arrival of an auto cargo from Detroit. One of the earliest openings on record is indicated for the port of Buffalo.

Pittsburgh Steamship Co., Pickands Mather & Co., M. A. Hanna Co. and Cleveland Cliffs Iron Co. expect to start their ore carriers toward upper lake ports on Mar. 26, weather permitting. The earliest opening of the Soo Canal was Mar. 23, 1942. This compares with an April opening last year.

The ore carriers have set a tentative goal of 90 million tons for the 1951 season. Shipments aggregated 78.2 million tons last year. Iron ore is needed badly at steel mills where supplies are dwindling rapidly. Despite all-rail shipments this winter, a stringency of certain grades likely will develop before the first lake cargoes are received.

Scrap . . .

Scrap Prices, Page 154

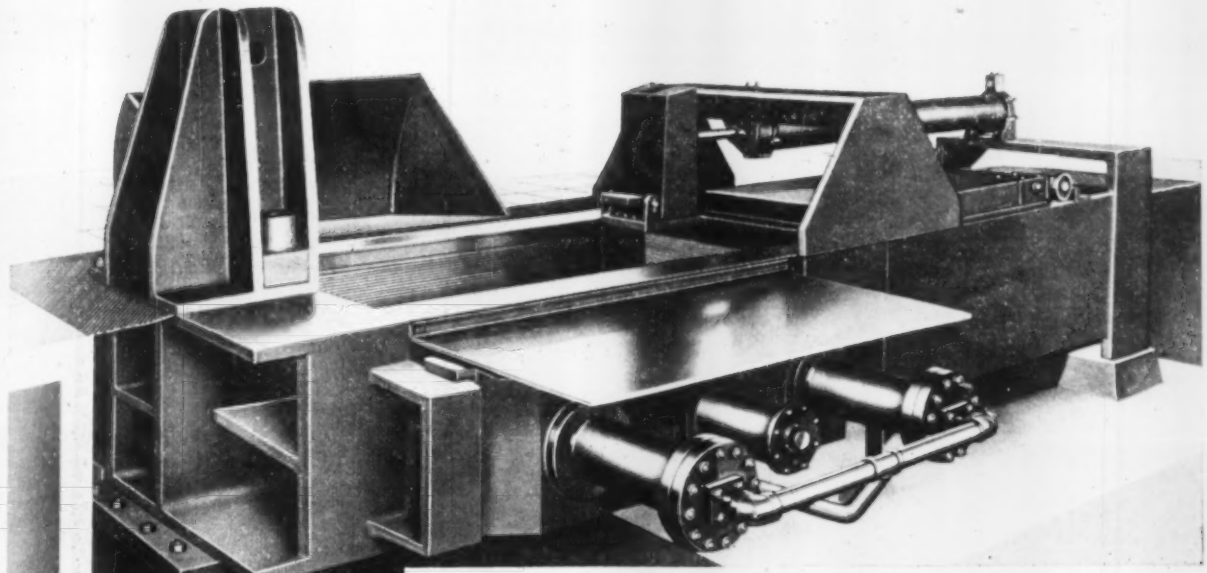
Pittsburgh—Steelmaking grades of scrap were reported flowing somewhat more freely from yards in this district last week though dealer stocks are low. Fear of an acute shortage of metallics, pig iron and scrap, prevails here and the mills are seeking by every means possible to encourage scrap collections. Mill stocks are described as moderate but continued capacity steelmaking operations are cutting steadily into inventories.

Scrap trade continues to seek removal of "bugs" in the government price stabilization order but so far no significant changes in the regulations have been effected. At the moment dealer concern is expressed over the possibility of increased scrap preparation by the mills. Such is made attractive by the $8 per ton differential between unprepared material and No. 1 heavy melting steel. If the mills did their own preparing they could possibly save several dollars per ton. Under the OPA in World War II this differential was only $3.50 per ton, not sufficient to make mill preparation particularly advantageous.

Boston—Good No. 1 heavy melting steel is in limited supply. Consumers in some cases are operating hand to mouth and under inventory limitations. Cast grades are in ample supply, although some foundry consumers charge upgrading.

Buffalo—One leading scrap dealer has been forced to lay off yard workers as a result of the sharp falling off in collections. Other layoffs are hinted. Yard activity is at low ebb and mills are seeking material as their reserve stocks shrink. Dealers are limiting renewal orders on OPS basis, to light tonnages. The shrinkage in offerings is shown by one of the leading railroads which split about 1000 tons five ways in a recent offering.

Philadelphia — Virtually 100 per cent of all railroad scrap and an increasing amount of industrial scrap is



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being allocated. Supply of both steel and cast grades is tight and may shortly restrict consumer operations.

Detroit—Scrap movement is restricted by the shortage resulting from dealers emptying their yards before the price freeze. Lacking clarification of price, the Cleveland base which permits a Detroit price of $40.20 is still adhered to on No. 1 heavy melting. Some foundries have approached maximum scrap consumption in their melt and have eased their pressure for larger supplies.

Cleveland—Dealers report a "dead" market here. Direct allocations of scrap from point of origin to consumers' plants is diverting large tonnages ordinarily processed here to other districts. One dealer plans to shut down his crusher if the flow of material through his yard does not improve soon. Consensus is that a pickup in activity will come around Apr. 1.

Cincinnati—A definite pickup in scrap shipments reflects better understanding of the price edict, more favorable weather, and improving condition on railroads. The most acute shortage is in cast grades and short rail.

Chicago—Scrap supply is below melting requirements. Industrial grades are flowing to mills in good volume but with furnaces operating at capacity and intake falling below consumption dipping into inventories is necessary. Although talk of allocations is increasing this practice as yet is confined mostly to railroad grades.

St. Louis—Scrap shipments are slow. Foundries are in tight position for cast. Mills are taking all the melting steel they can get but are not hurrying to place new orders.

Birmingham—Scrap shipments have picked up somewhat and some stockpiling is evident on the part of major users.

Los Angeles—Stabilization of prices is bringing more scrap into the market. Collections are up 10 per cent so far, and rising slowly but steadily.

Ferroalloys . . .

Ferroalloy Prices, Page 149

New York—Vanadium Corp. of America will more than double its production of metallurgical chrome ore as result of the purchase by its subsidiary, Rhodesian Vanadium Corp., of properties in Southern Rhodesia, South Africa. The acquisition, which multiplies the company's chrome ore reserves, will provide practically all of its chrome ore requirements.

The company also has made an agreement with Societe d'Electro-Chimie of France for use of the latter's process for manufacture of very low carbon ferrochrome. Production by this process is scheduled to begin later this year at the Niagara Falls plant.

Henderson, Nev.—Production of manganese dioxide at two southern Nevada plants is expanding. Western Electro-Chemical started production of manganese dioxide in its new plant here, on the shores of Lake Mead, and Manganese Inc. will start construction of a concentration plant in that locality. The Army Signal Corps contracted for the entire manganese dioxide output of Western Electro-Chemical, expected to reach 30 tons per day, for use in storage battery cells. Manganese Inc. holds a 10-year government contract for its entire manganese production. Construction of a $2 million plant to concentrate 1200 tons of manganese ore daily will start by April.

Warehouse . . .

Warehouse Prices, Page 149

Cleveland—Local warehouses anticipate a sharp upturn in building steel requirements with spring just around the corner. Signs of reviving construction already are in evidence, inquiry for tonnage increasing. However, the distributors are not in too good shape from the standpoint of stocks to care for much added business. Stocks in all categories are down and unbalanced, there is little prospect of any substantial replenishment soon with mill shipments irregular. Overall receipts from the mills have been substantial, but tonnage falls far under demand from consumers, coming from all directions. Warehouse business on DO account is currently estimated at only about 10 per cent of total distributor volume.

Cincinnati—Steel warehouses are pressed to meet urgent needs of old customers, hence are rejecting business offered from outside the district. Inventory shortages are found in nearly all categories. Heavy bars, sluggish heretofore, are now in more active demand. A dribble of foreign steel is doing little to meet needs as expressed in warehouse inquiries.

Pittsburgh—Warehouse operators anticipate an early upswing in building steel demand. Unusually favorable weather the past couple weeks has stimulated demand for structurals and reinforcing bars, and with all such items in tight supply the distributors anticipate a mad scramble for tonnage when the seasonal upturn in building really gets under way in a few weeks. Stocks of all steel products held by the warehouses are low and unbalanced. Further, shipments from the mills, while fair, are irregular. Consequently, buyers have to do a lot of shopping around to satisfy their requirements. Distributors here are entertaining some inquiry from outside the immediate district, and, where stocks permit, are filling such orders.

Birmingham—Volume of orders for warehouse steel remains at about the same level as during February.

Los Angeles—Lowered mill deliveries in February braked distributors' sales to 75 per cent of last year's peak. Demand is stronger than ever. Inventory turnover of structural shapes and plates at one warehouse is many times faster than normally.

Seattle—All warehouse items are in critical shortages, plates, sheets and cold-finished products being most acute. No evidence of hoarding is noted. Mill replacements are slow and generally behind schedule. Few purchases are backed by DO priority. A Los Angeles firm is offering Japan-made products, including 16 gage, hot-rolled plain sheets, prime material, and open-hearth plates, ¼ inch, 60 x 240 inches.

Fasteners . . .

Bolt, Nut, Rivet Prices, Page 148

Pittsburgh—Industrial fastener manufacturers are having their troubles these days getting sufficient steel to enable them to meet the heavy demands for bolts, nuts, rivets, etc., coming to them. They are entertaining a steadily mounting volume of defense and related orders, but steel supply has not kept pace. However, it is understood cutback in the railroad car program from 10,000 units to 9000 for May will release some much needed steel to the fastener makers for car components. Producers report that at the moment a particularly difficult supply condition exists in hot flats for nuts. However, all steel items are hard to get. Normal steel inventory in the fastener industry is said to run around 90 days, but under present scarcity conditions makers would be happy to accumulate 60 days' forward supplies.

Rails, Cars . . .

Track Material Prices, Page 147

Pittsburgh—Less steel will be allocated for the railroad car program in May as result of the 10 per cent cutback in the program to 9000 units for that month. However, the saving in steel will not be as great as indicated by the reduction of 1000 cars since some of the saved tonnage will be diverted to manufacturers of car components, such as makers of bolt, nuts and rivets. Actually, something like 300,000 tons of steel will go for cars in the month as against 310,000 tons currently. At the same time, word in the trade is to the effect the car program will be again upped to 10,000 units in June so that the supply respite so far as steel is concerned will be short-lived. The railroads continue to place new orders for cars. Latest bookings in this district involve three orders for 70-ton steel drop-end gondolas placed with the Greenville Steel Car Co. A total of 625 units is involved in the three orders, the Erie placing 500, the Southern Pacific 100 and the Illinois Terminal 25.

Canada . . .

Toronto, Ont.—With steel shortages reaching critical proportions controls have been increased and still further action may be expected.

Order No. 3 issued by Trade Minister Howe restricts use of steel in nonessentials, leaving unrestricted such construction as factories, public utilities, works for transportation and other essential projects.

Nuts and bolts used in construction are considered an end-use product and are not affected by the new order. However, producers are required to give the steel supplier a certificate that no materials supplied to him will be used or resold by him for restricted construction.

Toronto, Ont.—Primary iron and steel shapes produced in Canada in November amounted to 390,988 net tons compared with 376,953 in October and 316,219 tons in November, 1949. Shipments for sale in the month amounted to 255,642 net tons.

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We must use every bit of know-how and inventive skill we have to improve our machines and methods—to turn out more and more for every hour we work. Only in this way can we become militarily strong.

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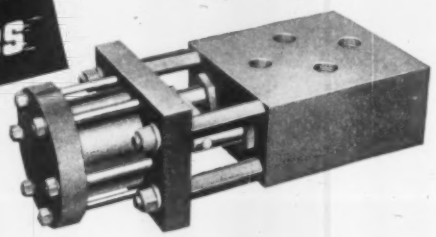

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STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

14,000 tons, state bridge, Jacksonville, Fla., to Bethlehem Steel Co.

6280 tons, veterans hospital, East 23rd street, New York, to Bethlehem Steel Co.

1900 tons, angles, Navy purchasing office, Washington, to Jones & Laughlin Steel Corp., Pittsburgh.

1400 tons, power house unit No. 3, Delaware Power & Light Co., Edgemoor, Del., to Bethlehem Steel Co.

1200 tons, angles, medium grade M, Navy purchasing office, Washington, to Bethlehem Pacific Coast Steel Corp., San Francisco.

750 tons, boiler house and incinerator, National Institute of Health, to LeCates & Co., Delmar, Del.

560 tons, state highway bridge, New Castle, Del., through James Julian, Elsmere, Del., to Phoenix Bridge Co., Phoenixville, Pa.

500 tons, plant, Lansdale Tube Co., Frederick, Md., to Lehigh Strfuctural Steel Co., Allentown, Pa.

450 tons, building, Sikorsky Aircraft Division, United Aircraft Corp., Bridgeport, Conn., to Fort Pitt Bridge Works, Pittsburgh.

350 tons, Washington state bridge, Lewis county, to Pacific Car & Foundry Co., Seattle; general contract to Anderson Bridge Co., Tacoma, low $314,475.

250 tons, Pier 57, North river, New York, to Harris Structural Steel Co., that city.

250 tons, addition to United Air Lines hangar, Seattle, to Pacific Car & Foundry Co., Seattle.

230 tons, Reading bridge, Weston, N. J., to Bethlehem Steel Co. This was noted in the Mar. 5 issue as involving 130 tons.

230 tons, addition, Du Pont plant, Waynesboro, Va., to Belmont Iron Works, Eddystone, Pa.

105 tons, New York Central bridge, Detroit, to Mt. Vernon Bridge Co., Mt. Vernon, O.

100 tons, including reinforcing, I beam bridges, Richardson highway, Alaska, to Pacific Car & Foundry Co., Seattle; Munter Construction Co., Seattle, awarded at $131,360.

STRUCTURAL STEEL PENDING

2000 tons, plant No. 2 Philco Corp., Philadelphia; bids closed Mar. 9.

7150 tons, municipal power plant, East 74th street, New York; Bethlehem Steel Co., only bidder.

6000 tons, relocation, railroad bridge superstructure, Fort Randall dam project, near Chamberlain, S. Dak.; American Bridge Co., Pittsburgh, low.

400 tons, plant addition, Fairchild Engine & Airplane Corp., Wyandench, Long Island, N. Y.; pending; Brown & Matthews, New York, general contractors.

375 tons, ordnance vehicle repair shop, Fort Richardson, Alaska; Valle-Sommers Construction Co., Seattle, low base, $1,423,400.

350 tons, second stage Albeni Falls dam, Idaho; Donovan-James Construction Co., Seattle, low to U. S. Engineer, $3,839,148.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1000 tons, grain elevator, Kennewick, Wash., to Bethlehem Pacific Coast Steel Corp., Seattle.

350 tons, Brooklyn-Queens Expressway, New York, to Jones & Laughlin Steel Corp., Pittsburgh.

100 tons, Juneau, Alaska, cold storage plant, and miscellaneous, to Bethlehem Pacific Coast Steel Corp., Seattle.

REINFORCING BARS PENDING

5750 tons, earthwork and structures, East Low canal, near Warden, Wash.; bids Mar. 22, Bureau of Reclamation, Ephrata, Wash.

2145 tons, spillway, outlet structures, dike and dam closure, Texarkana dam, Bowie and Cass counties, Texas; bids Mar. 21, district engineer, New Orleans.

1800 tons, reservoir, U. S. Engineer, Fort Randall, N. Dak.

460 tons, Congress Street Expressway, Maywood, Ill.

250 tons, addition to Tacoma, Wash., library, Macdonald Building Co., Tacoma, low base $1,072,309.

165 tons, bridge, Enid Reservoir area, Mis-

bids Mar. 28, Corps of Engineers, ...burg, Miss.
... bridge over Kentucky river, Carr..., Ky.
... ordnance vehicle repair shop, Fort ...dson, Alaska; bids in.
... apartment building, Rockford, Ill.
... $8 million service and recreation ...ings, Whittier, Alaska; bids to U. S. ...neer, Seattle, Mar. 27.

PLATES . . .

PLATES PLACED

... tons, grade M hull plates, Navy purchasing office, Washington, to United States Steel Co., Pittsburgh.
... tons, hull plates, Navy purchasing office, Washington, to Worth Steel Co., Claymont, Del.
... tons or more, 70 steel water tanks, Corps of Engineers, Chicago, to Columbian Steel Tank Co., Kansas City, Mo., $300,000.

PLATES PENDING

...5 tons, including angles, bars and miscellaneous items; bids to Federal Supply Service, Seattle, Mar. 6.
... tons or more, 500,000-gallon standpipe, Highland Falls, N. Y.; bids Mar. 23, village trustees.

PIPE . . .

CAST IRON PIPE PLACED

...25 tons, Oakway water district, Eugene, Oreg., 10 and 12 inch, to Pacific States Cast Iron Pipe Co., Provo, Utah.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Akron & Barberton Belt, one 1200-hp diesel switcher, to Baldwin-Lima-Hamilton Corp., Philadelphia.
Calumet & Hecla Consolidated Copper Co., one 1200-hp diesel-electric switch engine, to Baldwin-Lima-Hamilton Corp., Philadelphia.
Sharon Steel Corp., eight 800-hp and one 1200-hp diesel-electric switch engines, to Baldwin-Lima-Hamilton Corp., Philadelphia.
Wabash, two 1200-hp diesel-electric switchers, to Baldwin-Lima-Hamilton Corp., Philadelphia.

RAILROAD CARS PLACED

Canadian National, 50 box cars, to Eastern Car Co., Sydney, N. S.
Erie, 500 open-top gondola cars, to Greenville Steel Car Co., Greenville, Pa. Erie will start building 500 box cars in its Dunmore, Pa., car shops as soon as necessary materials are allocated.

RAILROAD CARS PENDING

Chicago, Burlington & Quincy; Denver & Rio Grande Western; Western Pacific, 22 stainless steel sleeping cars; bids asked.

FERROALLOYS

(*Continued from page 149*)

...6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Low-Carbon Ferrochrome: (Cr 67-72%.) Contract, carload, lump, bulk, max. 0.03% C 33.60c per lb of contained Cr, 0.04% C 31.50c, 0.06% C 30.50c, 0.10% C 30.00c, 0.15% C 29.75c, 0.20% C 29.50c, 0.50% C 29.25c, 1% C 29.00c, 1.50% C 28.85c, 2% C 28.75c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N.; add 5c for each 0.25% of N above 0.75%.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. S M x D, bulk, 23.25c per lb of contained Cr. c.l., packed 24.15c, ton 25.50c, less ton 27.25c. Delivered Spot, add 0.25c.

Foundry Ferrochrome, Low Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max.) Contract Carload, packed, S MxD, 16.35c per lb of alloy; ton lot 17.2c; less ton lot, 18.4c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 21.75c per lb of contained chromium plus 12.4c per pound of contained silicon; 1" x down, bulk 21.90c per pound of contained chromium plus

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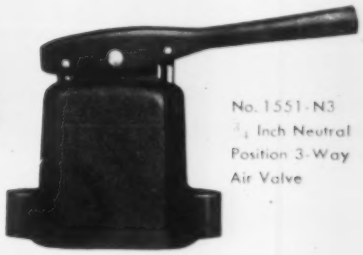

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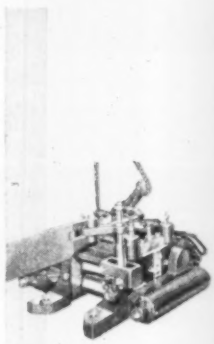

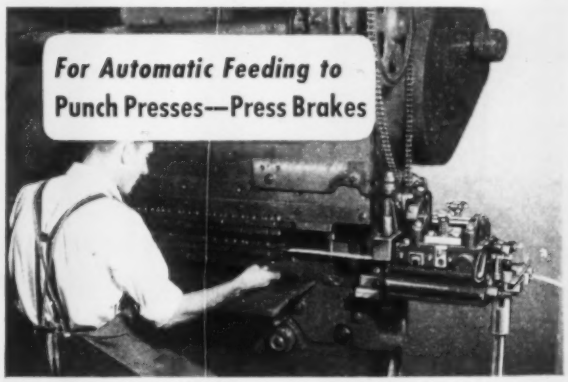

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12 60c per pound of contained silicon. F.o.b. plants, freight allowed to destination.

Ferrochrome Silicon, No. 2: (Cr 36-39%, Si 36-39%, Al 7% max.) 4 to 6c max.) 21.75c per lb of contained silicon, plus 12.4c per lb of contained silicon plus aluminum, 2" x down, delivered.

Chromium Metal: (Min. 97% Cr and 1% Fe) Contract carload, 1" x D, packed, max 0.50% C grade, $1.08 per lb of contained chromium ton lot $1.10, less ton $1.12. Delivered. Spot add 3c.

Tungsten Alloys

Ferrotungsten: (70-80% W). Contract, 10,000 lb W or more, $3.25 per lb of contained W 2000 lb W to 10,000 lb W, $3.25; less than 2000 lb W, $3.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.) Contract or spot, 1000 lb or more, $1.15 per lb of contained W, less than 1000 lb W, $1.25.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.00c per lb of contained Si; packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.40c per lb of contained Si, carload packed 14.0c, ton lot 15.45c, less ton 17.1c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 14.3c per lb of contained Si, carload packed 15.6c, ton lot 16.75c, less ton 18.0c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 15.55c per lb of contained Si, carload packed 16.8c, ton lot 17.8c, less ton 18.95c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 17.3c per lb of contained Si, carload packed 18.7c, ton lot 19.65c, less ton 20.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe) Cl. lump, bulk, regular 20.0c per lb of Si, c.l. packed 21.2c, ton lot 22.1c, less ton 23.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe.) Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.00c per lb of alloy, ton lots packed 11.30c, 200 to 1999 lb 11.65c, smaller lots 12.15c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 14.50c per lb of briquet, carload packed 15.2c, ton lot 16.0c, less ton 16.9c. Delivered. Add 0.25 for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.95c per lb of briquet, c.l. packaged 11.75c, ton lot 12.55c, less ton 13.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 11.15c, per lb of briquet, c.l. packed 11.95c, ton lot 12.75c, less ton 13.65c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si) Contract, carload, bulk 6.95c per lb of briquet, c.l. packed 7.75c, ton lot 8.55c, less ton 9.45c. Delivered. Spot, add 0.25c.

(Small size—weighing approx 2½ lb and containing exactly 1 lb of Si). Carload, bulk 7.1c, c.l. packed 7.9c, ton lot 8.7c, less ton 9.6c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

NOTE: Prices on titanium, vanadium, calcium, zirconium, boron and "other" ferroalloys appeared on page 174, Mar. 5, 1951, issue.

Less Steel for These Goods

Consumer durable goods for which manufacturers can use only 80 per cent as much iron and steel in the second quarter of 1951 as they used in the average quarter of the first six months of 1950 follow. For details of the NPA limitation order see page 57.

Furniture and Fixtures

All furniture and fixtures (excluding medical, dental, and hospital specialties and cooking hardware), including but not limited to: Household furniture such as bedroom, including bed springs, dining room, hall, household cabinets, kitchen, library, living room, porch and lawn (including beach furniture and sunroom chairs); theater seats, and sunroom furniture.

Office, public building, commercial, and restaurant furniture and fixtures such as desks, cases, cabinets, chairs, clothing racks, tables, sofas, stools, and tables. Non-industrial partitions (including toilet types), shelving, and lockers; show and display cases, cabinets, counters, and telephone booths.

Fireplace fixtures and equipment (including hardware, irons, and fire screens).

Lamp shades.

Mirror and picture frames.

Table tops.

Venetian blinds and shades.

Household Appliances

All household type appliances (electric, gas, and other) and their accessories including, but not limited to: Automatic food and garbage disposal units. Carpet sweepers. Cooking and heating appliances such as broilers, coffee percolators, urns, and makers; portable electric space heaters; roasters; stoves, ranges and hot plates; toasters; waffle irons and sandwich grilles.

Dishwashing machines.

Fans, 16 inches or under.

Floor waxers and polishers.

Food preparation appliances such as electric mixers, juicers, blenders, and squeezers.

Hot water heaters, domestic residential type.

Irons.

Laundry equipment such as driers, ironers, wringers, and washing machines.

Lawnmowers, rollers, seeders, and tampers.

Portable lamps, lamp holders, and lamp bases including but not limited to: Floor, bridge, torch, table, pin-up, and boudoir lamps exclusive of industrial, commercial, therapeutic and institutional specialty designed lamps.

Radio receivers, home, portable, and broadcast band automobile receivers; television sets, phonographs, record players, and combinations.

Refrigeration equipment such as household refrigerators; home and farm freezers under 13 cubic feet capacity; packaged air conditioning units (window and console types), 1 horsepower and under.

Vacuum cleaners.

Water softeners.

Jewelry, Games, Novelties

All jewelry and novelties including but not limited to: Jewelry, costume jewelry and novelties, jewelry cases, coasters, cocktail shakers, and accessories.

All games and toys.

Musical instruments.

Pipes and smokers articles including but not limited to: Ash trays; cigars, cigaret, and match holders; lighters; smoking stands and other smoking accessories.

Sporting and athletic goods.

Tricycles, scooters, sleds, and wagons.

Transportation

Aircraft, except military and commercial transport.

Bicycles, including accessories.

Motorcycles, motor scooters, motor bikes, including accessories.

Passenger automobiles (including jeeps and station wagons) and including accessories.

Ships and boats (nonmilitary, noncommercial) including but not limited to: Yachts, rowboats, canoes, motor-driven boats, outboard motor types and sail boats, and including accessories.

Utensils and Cutlery

Pocket knives.

Silver and plated ware including, but not limited to: Flatware, hollow ware, novelties, toilet ware and trophies.

Table and kitchen cutlery such as all types of knives, forks, spoons, and carving sets.

Miscellaneous

Cameras, amateur box-type still picture, fixed focus (except reflex).

Coin-operated amusement machines including but not limited to: Pin-ball machines, juke boxes, bell type machine, skill games, and other arcade pieces.

Display models and display patterns.

8-mm motion picture cameras and projectors.

Mortician's goods including burial caskets, coffins, and vaults, but excluding mortician's instruments and supplies.

Paper weights, desk trays, and letter openers.

Signs and advertising displays.

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Metalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

California

Hall Scott Motor Co., Berkeley, Calif., leased a building in Richmond shipyard No. 1 from Parr-Richmond Industrial Corp., Richmond, Calif. The company is expecting a contract to build motors for the government.

California

W. & W. Mfg. Co., Glendale, Calif., is building a plant for manufacture of electronic parts. Completion is scheduled by May 1.

California

Solar Aircraft Co., San Diego, Calif., will expand factory space at San Diego and Des Moines plants.

California

Cooper Precision Products Corp., Los Angeles, is constructing an addition to its plant for manufacture of special aircraft bolts and screws.

California

Teletronic Laboratory Corp., Los Angeles, opened a plant at the Los Angeles International Airport industrial tract to manufacture precision electronic equipment.

California

Hercules Powder Co., Wilmington, Del., moved its San Francisco office to the Standard Oil Bldg., 225 Bush St.

California

C. A. Dunham Co., Chicago, appointed Tay-Holbrook Co., San Francisco, as its stocking jobber in central and northern California. Products include pumps, unit heaters, cabinet and baseboard convectors, finned pipe radiation, traps and valves.

Connecticut

I. H. Bradley & Sons, Bridgeport—wood turning and sawing machinery—purchased and is now producing the Boering tool line, consisting of hand and foot operated presses to speed light manufacturing assembly.

Connecticut

Cro-Plate Co. Inc., Hartford, is operating a new chromium plating plant in that city.

Delaware

Security Tool Corp.—machinery—filed a charter of incorporation with the secretary of state's office, Dover, Del. U. S. Corporation Co., Dover, is serving as the principal office.

Delaware

Nickel Processing Corp.—metals—was chartered by the secretary of state's office, Dover, Del. Corporation Trust Co., Wilmington, Del., is serving as the principal office.

Illinois

Army Ordnance Dept. contemplates erection in Rockford, Ill., of a $5 million ordnance plant to be operated by W. F. & John Barnes Co., that city.

Illinois

Deepfreeze Division, **Motor Products Corp.,** Detroit, opened its plant west of Lake Bluff, Ill.

Illinois

Tinius Olsen Testing Machine Co., Willow Grove, Pa., appointed Gnaedinger & Van Zelst Labquip Corp., 4520 W. North Ave., Chicago 39, as its sales representative.

Kansas

Ward Leonard Electric Co., Mt. Vernon, N. Y., appointed Maury E. Bettis Co., Kansas City, Mo., as its industrial and electronic sales representative for that area.

Maryland

Bendix Radio Division, Bendix Aviation Corp., Towson, Md., is erecting a manufacturing addition to its plant. The company is negotiating for lease of buildings which occupy the former Pimlico airport for use of its engineering departments. It recently acquired some 250,000 square feet at several locations for manufacture.

Maryland

Metal Slitters Inc., Baltimore, awarded a contract for a plant addition.

Maryland

Uniquip Inc., Baltimore, has been incorporated to handle a new type all-purpose metal framing for use by piping and electrical contractors and industrial plants. Baltimore Broom Machine Co. Inc., that city, will do the fabricating and storage for the new company.

Michigan

Scott Carpenter and Donald Dunnabeck purchased **Metal Craft Co.,** Detroit, from Dexter Horton. The company produces stampings, assemblies, roll forms and finishes

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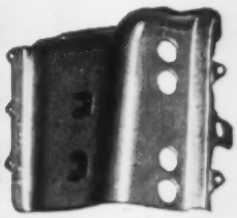

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Missouri

Lily-Tulip Corp., College Point, N. Y., is erecting a $2 million plant in Springfield, Mo.

Missouri

Joseph T. Ryerson & Son Inc., Chicago, is expanding its St. Louis plant. The program involves reconstruction and new layout of the present plant and construction of additional warehouse space, totaling about 50,000 square feet.

New Jersey

Metal Finishing Division, **Pyrene Mfg. Co.,** Newark, transferred its operations to enlarged quarters, the Pyrene plant on Empire street, that city. About 10,000 square feet of floor space are devoted to plating, polishing and anodizing operations. About 10,000 square feet are utilized for parkerizing, bonderizing, parco lubrizing, electroniz and other chemical processes for metal treatment.

New York

Colorado Fuel & Iron Corp. will move its executive offices Mar. 12 to 575 Madison Ave., New York 22. The company's new telephone number is Murray Hill 8-5400.

New York

Chemical Construction Corp., subsidiary of American Cyanamid Co., New York, developed a new process for refining low-grade sulphur ores. The process opens the way to development of large deposits in the Andes mountains of South America and in the western part of the United States.

New York

Speco Inc., Cleveland, opened an eastern district sales office at 30 Church St., New York, in charge of David M. Waterhouse, district manager. Speco manufactures maintenance products, including antirust, chemical-resistant, and high-heat resistant paints.

New York

John M. H. Shline Co., New York, was appointed exclusive representative and distributor in the United States for a line of crawler diesel tractors and equipment produced by the firms of **John Fowler & Co. (Leeds) Ltd.** and **Marshall Sons & Co. Ltd.,** both of England. Shline is also distributor for **Brockway Tractor Co.,** Cleveland, and **Hoist-O-Matic,** Kansas City, Mo.

New York

Mohawk Machine Tool Rebuilders Inc. was incorporated in Buffalo with capital of $50,000. Incorporators are Joseph A. Fiddler, Richard D. Gruntz and Harry Abt.

Ohio

Donald Marks Steel Co., 3685 Lynnfield Rd., Cleveland, was organized as a steel broker with warehouse facilities at 82nd street & Bessemer road, that city.

Ohio

A. Milne & Co.—tool and specialty steel distributor—New York, opened a warehouse at 20 S. Charter St., Dayton, O., under the direction of John I. Kitts.

Pennsylvania

Sheffler-Gross Co., Philadelphia, assumed the account of **Homestead Valve Co.,** Coraopolis, Pa., Mar. 1.

Pennsylvania

Parker Appliance Co., Cleveland, appointed Goodyear Supply Co., Philadelphia, as distributor for precision aircraft and industrial O-rings.

Texas

Federated Metals Division, American Smelting & Refining Co., New York, moved its Houston administrative personnel into its new office building at 9000 Market Street Rd.

Texas

Allis-Chalmers Mfg. Co., Milwaukee, appointed Petro-Chemical Equipment Co., Houston, as a dealer for Allis-Chalmers motors, controls, blowers, compressors and Texrope drive equipment.

Washington

Spokane Portland Cement Co., Spokane, Wash., plans a $3.5 million plant expansion at Irvin, Wash., doubling capacity, if materials can be obtained.

Canada

Richardson-Allen Corp., College Point, Long Island, N. Y., has incorporated a Canadian company to manufacture voltage rectifiers, battery chargers and other electrical equipment. Wesley S. Block Jr. is president and Cecil E. Brigham is vice president of Richardson-Allen of Canada Ltd., Toronto.

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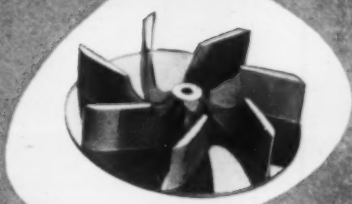

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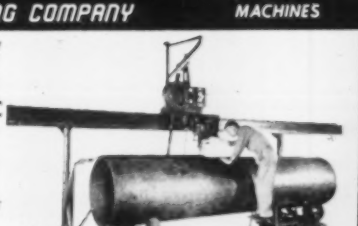

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